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MILLER (H. J.). **A method of obtaining a high incidence of powdery mildew on Snap Beans in the greenhouse for fungicide screening tests.**—Abs. in *Phytopathology*, 42, 2, p. 114, 1952.

Although powdery mildew [*Erysiphe polygoni*] develops readily on snap beans [*Phaseolus vulgaris*] in the greenhouse, growth and maturity of the host, with subsequent defoliation, exceed the rate of spread of the disease, so that adequate counts are difficult to obtain in fungicide trials [*R.A.M.*, 31, p. 248]. The treatment of plants at the primary leaf stage with a spray of 0·125 per cent. maleic hydrazide or 0·01 per cent. pentachlorobenzoic acid inhibits trifoliate leaf growth and causes the retention of the primary leaves, with a resultant increase of vigour. The primary leaves can be sprayed once with a fungicide and kept in the greenhouse until there is a sufficient build-up of mildew for a good reading. The following are typical control figures, as indicated by the average number of spots on two leaves of four plants: checks (maleic hydrazide and pentachlorobenzoic acid) 118 and 210, respectively; wettable sulphur 4 in 100, 0; and NP–770 (a complex phenol) 1 in 100, 8.

HILDEBRAND (A. A.) & KOCH (L. W.). **A study of systemic infection by downy mildew of Soybean with special reference to symptomatology, economic significance and control.**—*Sci. Agric.*, 31, 12, pp. 505–518, 4 pl., 1951.

In studies on soy-bean downy mildew (*Peronospora manshurica*) [*R.A.M.*, 25, p. 297; 29, p. 397] carried out at the Dominion Laboratory of Plant Pathology, Harrow, Ontario, the highest incidence of systemically infected plants grown from non-treated, oospore-encrusted Harman seed in 1947 in the greenhouse and from 1946 to 1948, inclusive, in the field was 37 and 12·9 per cent., respectively. Oospore-encrusted A. K. Harrow seed kept under warm storage conditions gave a higher percentage of systemically infected plants than Harman; under cold storage conditions the relative position of the two varieties was reversed. From 1946 to 1948, inclusive, treatment of infected seed with spergon (3 oz. per bush.) and fermate (2 oz.) increased emergence in four out of five field trials, virtually eliminated the incidence of systemically infected plants in all five, and in one significantly increased the yield.

MCKEEN (C. D.). **An occurrence of rot of Spanish Onion seedlings caused by Botrytis allii.**—*Sci. Agric.*, 31, 12, pp. 541–545, 1 pl. 1951.

Botrytis allii [*R.A.M.*, 9, p. 434; 30, p. 211] occurred on young Spanish onion seedlings in late May and early June, 1948, in a field at Leamington, Ontario. Infection and decay of young transplants were favoured by low soil temperatures, the highest mortality occurring at 15° C. and becoming progressively lower at 20° and 25°.

Campacci (C. A.). **O míldio da Cebola.** [Onion mildew.]—*Biológico*, 17, 11, pp. 191–196, 2 figs., 1951.

In connexion with the occurrence in Rio Grande do Sul and elsewhere in Brazil of onion downy mildew (*Peronospora destructor*) [*R.A.M.*, 27, p. 122], information is presented on its geographical distribution [C.M.I. map No. 76], history, hosts, symptomatology, and control.

Pettinari (Carla). **Phyllosticta multiformis n. sp. su foglie di Lactuca scariola L.** [*Phyllosticta multiformis* n.sp. on leaves of *Lactuca scariola* L.]—*Ann. Sper. agr.*, N.S., 6, 1, pp. 119–125, 2 pl., 1952. [English summary.]

In 1950, plants of *Lactuca scariola* [*L. serriola*] growing in cultivated ground near Bari, Italy, developed a dry leaf spot caused by a *Phyllosticta* with pycnidia measuring 200 to 500 μ in diam. and conidia measuring 5·5 by 2 to 3 μ. In culture on different media the fungus, which is named *P. multiformis* n.sp., showed a wide range of growth characters. In inoculation experiments lettuces developed spots which differed slightly from the original. The fungus was reisolated. On potato glucose agar the colonies were whitish for the first three days and darkened at the centre during the next three as a result of the formation of glomerules of dark hyphae, from which arose the primary pycnidia. Between the sixth and the ninth day pycnidial formation began, these organs reaching maturity in about two weeks. After the colony had covered the plate the whitish halo disappeared; blackish-brown, greenish-brown, or dark fuliginous grey hyphae adhered to the substratum, but a pale grey aerial mycelium developed in cottony tufts, the dark hyphae underneath being invisible. A characteristic feature, especially in colonies over one month old grown on potato agar and carob agar, was the presence of arthroconidia and pseudoconidia. In the centre of 21-day-old colonies on potato glucose agar was a crusty mass of very small pycnidia, mostly 200 to 300 μ in diameter, closely pressed together and nearly all pyriform and shortly umbonate, often with a single locule and surmounted by numerous small umbos. Round this crusty central zone was a wide concentric band of pale grey mycelium containing immersed sparse or sparsely grouped pycnidia, which in old colonies were raised up by hyphae massed into irregular coremia. These formations were lacking on some media, but were always present on potato agar and malt agar.

Basile (Rita). **Associazione di Sclerotinia sp. e Pythium sp. in un marciume dell' Insalata (Lactuca sativa).** [Association of *Sclerotinia* sp. and *Pythium* sp. in a rot of Lettuce (*Lactuca sativa*).]—*Ann. Sper. agr.*, N.S., 6, 1, pp. 207–212, 6 figs., 1952. [English summary.]

In January, 1950, isolated lettuce seedlings growing near Genova–Pegli, Italy, developed a severe rotting of the collar and basal leaves associated with *Botrytis* sp. [cf. *R.A.M.*, 31, p. 270] and *Pythium* sp. In February, 1951, groups of three potted Trocadero lettuces under glass jars were inoculated with the fungi separately and together. Three days later those inoculated with *Botrytis* bore necrotic areas on the leaves, which fell out; those with *Pythium* developed small spots which spread and produced rotting; the third group showed both types of symptom and developed a more severe wilt than that caused by either fungus alone, becoming completely rotted in a week. The fungi were reisolated from the infected material and the inoculations repeated, with identical results. When grown together in culture the two fungi showed antagonism only when sown on different dates. [No *Sclerotinia* is mentioned as having been found by the author.]

Friedman (B. A.). **Soft rot of Lettuce and Escarole caused by Pseudomonas marginalis.**—Abs. in *Phytopathology*, 43, 2, p. 112, 1952.

The examination at the New York market of the leaves of Arizona-grown lettuce

and Florida-grown escarole [endive] (*Cichorium endivia*) affected by slimy rot revealed bacterial contamination. The three isolates obtained from endive and the six from lettuce induced soft rot on inoculation into the leaves of both hosts. The Gram-negative rods formed a greenish, fluorescent pigment in asparagine broth but no pyocyanin; they liquefied gelatin, reduced nitrates to nitrites, and produced acid, but no gas, from sucrose, lactose, and maltose in bromcresol purple synthetic broth. The organisms are considered to be identical with *Pseudomonas marginalis* [*R.A.M.*, 27, p. 404].

Vasudeva (R. S.) & Nariani (T. K.). **Host range of Bottlegourd mosaic virus and its inactivation by plant extracts.**—*Phytopathology*, 42, 3, pp. 149–152, 1952.

At the Indian Agricultural Research Institute, New Delhi, material of *Cucumis* virus 2 C [a strain of cucumber green-mottle mosaic] from *Lagenaria leucantha* [*R.A.M.*, 31, p. 420] caused localized infection without inducing symptoms on inoculated leaves of tobacco, White Burley tobacco, *Solanum nigrum*, and *S. nodiflorum*, but did not attack tomato or chilli. Leaf extracts of *Datura stramonium* and chilli at a dilution of 1 in 100 and of *S. nigrum* and tomato at 1 in 1,000 inhibited the activity of the virus, and in the case of the two former a similar effect was exerted by storage of the virus with the extracts at 1 in 10. The toxic principle in the *D. stramonium* leaf extract was destroyed by heating to boiling point and dilution with water, but was not inactivated by desiccation.

Zibimate—the new selective fungicide.—*Mushroom News* (W. Darlington & Sons, Ltd., Worthing, Sussex), 3, 7, pp. 144–145, 1952.

The principal fungi attacking mushrooms were found to produce the correct enzyme for breaking down dithiocarbamates, thus releasing toxic sulphur compounds which kill them, but the mushroom does not produce this type of enzyme, and remains, therefore, immune from the fungicide. In trials on the Experimental Farm at Angmering, Sussex, zibimate dust, containing 15 per cent. of the active ingredient zineb [cf. *R.A.M.*, 31, p. 462 *et passim*] and used at 3 to 4 oz. per 1,000 sq. ft. of bed space, gave the best results. It is intended primarily as a preventive, to be applied before the appearance of the first break, and where used from the time of casing gave excellent control of bubble (*Mycogone*) [*perniciosa*: ibid., 30, p. 554]. For *Dactylium* [spp.: ibid., 30, p. 555] and *Verticillium* [spp.: loc. cit.], which are more resistant, the treatment should be started early enough and continued regularly. Bacterial spot [unspecified: see next abstract] was also found to respond to zibimate treatment. An electric fan placed in the centre of the house facilitates even distribution of the dust.

Wood (F. C.). **Some bacteria causing diseases of cultivated Mushrooms. 1—Bacillus polymyxa.**—*Mushroom News* (W. Darlington & Sons, Ltd., Worthing, Sussex), 3, 7, pp. 153–154, 2 figs., 1952.

With the help of a special technique (Ledingham *et al.*, *Canad. J. Res.*, Sect. F., 23, p. 48, 1945), *Bacillus polymyxa* was isolated from the casing soil around clumps of mushrooms affected by bacterial pit [*R.A.M.*, 30, p. 556]. In inoculation experiments, conducted under the usual test conditions, positive results were obtained in 24 to 48 hours in all cases. Discoloration of the whole cap occurred in some mushrooms, while the majority developed the familiar bacterial spot [see preceding abstract] symptoms ranging from slight discoloration to intense spotting. In the larger mushrooms this discoloration together with deep cracking and peeling of the stem (typical of bacterial pit) became pronounced after five days. In another inoculation experiment with sprayed mushrooms from a commercial mushroom house spotting and discoloration occurred in 24 hours at 60° F. *B.*

polymyxa was readily reisolated from inoculated mushrooms in all tests and was also found to produce rotting characteristic of the bacterial rot associated with *Erwinia carotovora* [ibid., 30, p. 303].

CARPENTIER (SIMONE). **Étude morphologique et cytologique de l'action de substances fongicides ou insecticides sur la croissance de la plantule d'Arachide.** [A morphological and cytological study of the action of fungicides or insecticides on the growth of the Groundnut seedling.]—*Rev. Bot. appl.*, 31, 349–350, pp. 598–605, 7 figs., 1951. [Received 1952.]

In experiments carried out in the Plant Biology Laboratory of the Sorbonne, Paris, when groundnut seed dusted with arasan or seedlings were placed on filter paper dipped in a suspension of arasan in water (1 in 10,000, 1 in 1,000, 1 in 500), at 25° C., no harmful effect on growth ensued. A suspension (1 in 1,000) of verisan [*R.A.M.*, 29, p. 153] (containing 1·5 per cent. mercury in the form of methoxyethyl mercury silicate) arrested root development, but dusted on to the seed the compound was not injurious. In greenhouse dusting tests neither arasan nor verisan had any harmful effect, and a mixture of three parts arasan and one part 70 per cent. *gamma*-BHC appeared to improve growth [cf. ibid., 30, p. 212].

NETO (J. P. DA C.). **As manchas do Amendoim (Arachis hypogaea L.), causadas por Cercospora, no Estado do Rio Grande do Sul, Brasil.** [The spots of Groundnut (*Arachis hypogaea* L.) caused by *Cercospora* in the State of Rio Grande do Sul, Brazil.]—*Rev. Agron., Porto Alegre*, 15, pp. 85–87, 1 fig., 1951.

The examination of *Cercospora*-infected groundnut specimens from different parts of the State of Rio Grande do Sul, Brazil, demonstrated the occurrence of both *C. personata* and *C. arachidicola* [*R.A.M.*, 31, p. 274; C.M.I. maps Nos. 152, 166], the latter not hitherto recorded for Brazil.

GALLAY (R.), TERRIER (C.), & TRIVELLI (G.). **Le mildiou de la Vigne—les expériences de 1951.** [Vine mildew—1951 experiments.]—*Rev. rom. Agric.*, 7, 11, pp. 81–90, 2 diags., 3 graphs, 1951.

Although vine mildew (*Plasmopara viticola*) in Switzerland was more severe during 1951 than in any year since 1939 [*R.A.M.*, 30, p. 599; 31, p. 315], the superiority of Bordeaux mixture in controlling the disease was established beyond doubt. In experiments at Pully the percentages of grapes destroyed following applications before and after flowering were for Bordeaux mixture (1·5 and 2 per cent.) 5·4, copper oxychloride A (at manufacturer's specification) 5·4, copper oxychloride C (0·5 and 1) 4·8, copper oxychloride D (0·5 and 0·75) 6, and copper carbonate A (1 and 1) 4·8. Copper oxide A at 0·4 per cent. before flowering and Bordeaux at 2 per cent. after allowed only 1·5 per cent. mildew, and organic products B and C (the latter plus a copper salt) 0 and 2·9 per cent., respectively. A list is given of the products authorized for use in 1952, various copper compounds other than Bordeaux mixture being recommended for use before flowering and 2 per cent. Bordeaux after or else copper carbonate (at manufacturer's specification) if it is feared that the copper deposits may lower the quality of dessert grapes. The normal frequency of application (every ten days) should be closed up when spots are present on the leaves and conditions favour infection.

COOMBE (B. G.). **Grape yields increased by zinc swabbing.**—*J. Dep. Agric. S. Aust.*, 55, 9, pp. 456–457, 2 figs., 1952.

Growers whose vines do not show obvious signs of zinc deficiency (or little leaf) are advised to test for this disorder by swabbing the pruning cuts on two rows of plants for at least two successive seasons with 2 lb. zinc sulphate in 1 gal. water

[*R.A.M.*, 30, p. 403]. The increase in yield compared with unswabbed vines will determine whether such treatment is worth while. Four rows of Grenache at McLaren Flat swabbed in 1950 and 1951 yielded 808 buckets in 1952 as against 532 buckets from the untreated. At Nuriootpa 12 plots swabbed in 1951 yielded 163 lb. and the untreated plots 125 lb. Two rows at Clare swabbed in 1949 yielded 250 lb. of prunings in 1950 as against 197 lb. It is essential to swab within a few hours of pruning otherwise no response is obtained. Weaker solutions (1 or 1½ lb.) should be used if bud kill occurs.

Zogg (H.), Horber (E.), & Salzmann (R.). **Pflanzenschutz B. Ex Bericht über die Tätigkeit der Eidg. landwirtschaftlichen Versuchsanstalt Zürich-Oerlikon pro 1949–50.** [Plant protection B. *Ex* Report on the work of the Federal Agricultural Experiment Station, Zürich-Oerlikon, for 1949–50.]—*Annu. agric. Suisse*, 52, 5–6, pp. 512–531, 3 figs., 2 graphs, 1951.

During the period under review [cf. *R.A.M.*, 30, p. 262] fungi causing desiccation of cereal leaves, e.g., *Ascochyta graminicola* [ibid., 27, p. 349], *Septoria nodorum*, *S. tritici*, *Leptosphaeria tritici*, and *S. avenae* [*L. avenaria*: ibid., 25, p. 155; 31, p. 379], were again widespread in the canton of St. Gall, the Linth plateau, and central Switzerland. In some areas wheat was so heavily infected by bunt (*Tilletia tritici*) [*T. caries*] that large clouds of spores were released from the threshing machines. The number of infected ears per 20 sq. m. in a field trial was reduced from 221 to 3 by dusting with ceretan [ceresan], the corresponding figures for two organic mercury preparations and a copper being 5·7, 7·1, and 4·3, respectively. Using Gassner's laboratory method of assay [ibid., 31, p. 428], the infection ratings for the untreated, ceresan, the two organic mercury compounds, and copper series were 5, 0·3, 0·1, 1·1, and 0·1, respectively.

New foci of potato wart disease (*Synchytrium endobioticum*) were notified from the region of Einsiedeln and Val Colla (Ticino).

Cercospora beticola occurred in an unusually severe form on fodder and sugar beets [ibid., 27, p. 220] in various districts. Control of damping-off [of unspecified origin] appears to be practicable only in uncontaminated ground, judging by the results of comparative tests in heavily infested soil and sterile brick dust; under the former conditions six fungicides proved ineffectual, whereas in the latter series very good results were achieved with two organic mercury preparations and dichloronaphthoquinone dust.

Pflanzenschutz-Tagung der Biologischen Bundesanstalt Braunschweig in Goslar, 11.–14. Oktober 1950. [Plant protection session of the Brunswick branch of the Federal Biological Institute at Goslar, 11th to 14th October, 1950.]—*Mitt. biol. ZentAnst. Berl.* 70, 140 pp., 10 figs., 2 graphs, 1951.

Among the subjects discussed at the above-mentioned conference were (pp. 7–10) the functions and aims of plant protection [*R.A.M.*, 29, p. 164] (Dr. Drees); (pp. 11–14) disease, weather, and radiation (H. Bortels) [ibid., 31, p. 134]; (pp. 14–16) instruction in plant pathology ([H.] Zillig); (pp. 16–19) the functions of plant protection in the planning of crop rotation on Schleswig-Holstein farms (H. Bockmann); (pp. 27–32) plant protection equipment requirements and their present status [with special reference to insect pest control] (L. Schumacher); (pp. 50–51) seed potato certification practice and the taking of samples [with special reference to viroses: ibid., 28, p. 587] (I[rmgard] Hauschild); (pp. 64–68) on the leaf pigment contents of healthy and leaf roll-diseased potato plants (O. Bode); (pp. 69–72) observations on the occurrence of virus-transmitting aphids on potato plants in relation to manuring (J. Völk); and (p. 80) on virus and suspected virus phenomena in fruit culture (T. Thiem).

E. L. Loewel (pp. 40–42) reports promising results from the substitution of mercurials for copper in the pre-blossom sprays against apple scab (*Fusicladium*) [*Venturia inaequalis*] in further experiments at Jork, Schleswig-Holstein, in 1950 [ibid., 30, p. 327]. Thus, two applications of aaventa [ibid., 31, p. 477], the first at 0·2 per cent. in the 'mouse ear' stage and the second at 0·15 per cent. in the cluster, were almost equally effective with 2 per cent. home-made Bordeaux for the former treatment and 0·75 per cent. of a proprietary copper fungicide for the latter.

As in 1949, the adhesiveness of all the post-blossom fungicides tested, especially fuclasin [ibid., 30, p. 327], was notably increased by lead arsenate, which should not, however, be used in conjunction with pomasol, since the combination is injurious to the foliage. Summer oil proved superior even to lead arsenate as an adjuvant for fuclasin, not only enhancing adhesiveness but also leaf growth. Fermate was included in the trials with satisfactory results in respect of both scab control and growth, which was conspicuously benefited by the dense, black coating. Wettable sulphurs were not quite as efficient as the organic preparations, but they merit further testing on account of their freedom from phytotoxic effects.

Extensive comparative tests with the three organic fungicides most commonly used against *V. inaequalis*, viz., fuclasin, nirit [ibid., 31, p. 67], and pomasol, revealed no material difference in efficiency, the increasing popularity of the first-named among Lower Elbe growers being attributable to the remarkable improvement it confers on leaf growth.

[H.] Zycha (pp. 43–45) summarizes the present position with regard to three acute problems in German forest pathology, constituted by the attacks of *Rhabdocline pseudotsugae* and *Phaeocryptopus gaeumanni* on Douglas fir [*Pseudotsuga taxifolia*: ibid., 29, p. 67]; *Armillaria mellea* on spruce [cf. ibid., 14, p. 677]; and cortical necrosis of beech trees [ibid., 31, p. 91], mostly upwards of 100 years old, originating as a local dying off of the bark and rapidly turning into a lethal white rot. The apparent immunity of the green forms of *P. taxifolia* from infection by *R. pseudotsugae* has proved to be illusory, wide divergences in susceptibility having been observed of recent years which will necessitate selection for resistance in the future. A measure of control, however, may also be exerted by the choice of more suitable sites, avoiding those where the damp conditions favouring infection tend to prevail during the period of shoot production. In respect of *Phaeocryptopus gaeumanni* the situation is similar; the green forms are as susceptible as the grey and blue, and heavy losses can be averted only by a very expeditious selection of resistant forms. No information is available as to the existence of spruce types resistant to *A. mellea*, but the depredations of the fungus may be minimized to a certain extent by the avoidance of sites where the ground is liable to dry out.

H. Johannes (pp. 45–46) again demonstrated in 1950 that the spread of *Septogloeum populiperdum* in poplar nurseries [ibid., 30, p. 5] can be largely restricted by frequent spraying during the growing season with a copper fungicide at up to 2 per cent., but direct control of the fungus in the leaf tissue appears to be impracticable, and the cultivation of resistant species, namely *Populus grandis*, the Graffhorst poplar (*P. gelrica* type), and the 'green' form of *P. robusta*, is accordingly recommended.

H. Braun (pp. 47–49) reports on the results to date of investigations, still proceeding at the time of writing, on the rot of stored potatoes caused by *Alternaria solani*, which has been observed to develop even on tubers showing no sign of infection when lifted. Although in one consignment of Erstling [Duke of York] the incidence of decay, estimated at 10 per cent. on 26th October, 1949, had only reached 15 per cent. by the following 25th February, in spite of an exceptionally high temperature being maintained, further large-scale tests on this aspect are necessary. The possibility that extraneous infection might be conveyed to the

tubers in transit or storage by spores retaining their viability on the skin or in waggons or warehouses was investigated with negative results. Isolates of *A. solani* from lesions on tomato fruits induced typical symptoms on potato foliage and tubers. Early varieties were found to be uniformly more susceptible than late ones, and the smooth-skinned than the rough. All the strains of the pathogen tested to date proved equally pathogenic, at any rate under optimum conditions, to the foliage and tubers. In the course of its rapid progress through the tubers *Fusarium caeruleum* entirely overgrows *A. solani*, which develops very slowly and seldom penetrates deeper than a few mm. into the flesh. Another obstacle to the detection of *A. solani* in the tubers is its apparent failure to produce conidia. It seems more likely that secondary invaders enter the tuber through mechanical injuries rather than by way of the very hard lesions produced in the tissues by *A. solani*.

F. Sprau (pp. 51–55) describes the results of tests on potato eye cuttings (mostly Ackersegen and Sieglinde) for viroses by hydroponic culture [see below, p. 571], the differentiation of healthy from diseased material being made on the basis of root development, which when very weak to moderate is an index of virus infection. The estimates of infection agreed reasonably well with those based on aerial symptoms in the case of leaf roll, but for mosaic and streak viruses [? Y] the discrepancies between root development and health were too great to permit of a reliable diagnosis.

Mention has already been made of M. Klinkowski's experiments to determine the possibility of infection by potato virus X through root contact [ibid., 30, p. 579]. In this further contribution to the subject (pp. 59–61) he states that in the early stages of development there was no apparent difference between healthy and diseased plants [ibid., 31, p. 453], but as time advanced the contrast became progressively more striking, the latter dying off prematurely.

Further experiments by R. Bercks (pp. 61–64) [ibid., 31, p. 510] confirmed his previous conclusion as to the increase of resistance to potato virus X in the Flava and Capella varieties with advancing maturity. In plots on sandy soil both varieties succumbed more readily to the disease where a complete fertilizer was supplied than in the absence of one or more of the ingredients.

Of the several methods of procuring seed beets free from virus yellows [see below, p. 536] tested by W. Steudel (pp. 72–74), the most hopeful was the separation of steckling and seed beet cultivation, transferring the former to the Eifel mountains (Rheinland), where the incidence of viroses is negligible. In 1949 and 1950 the health of second-year steckling stands from this area was excellent, the growth of the plants luxuriant, and the seed yields high.

Studies by L. Quantz (pp. 74–79) on bean (*Phaseolus vulgaris*) viruses revealed a considerable admixture of the yellow mosaic virus [ibid., 31, pp. 370, 469] with the widespread bean mosaic virus [ibid., 13, p. 670; C.M.I. map No. 213]. The symptoms of the former agreed with those of the pod-distorting strain [*R.A.M.*, 29, p. 284]. Among the natural hosts of yellow mosaic were yellow and white lupins and alsike clover, and it was also transmitted experimentally to pea, broad bean, sweet pea, soy-bean, and *Melilotus alba*. Besides the foregoing, [W.] Kotte has observed a pod-spotting virus on pole beans which was identified by [E.] Köhler as tobacco ring spot virus [cf. ibid., 29, p. 135].

Härle (A.). **Die wichtigsten Krankheiten und Schädlinge an Kulturpflanzen im Jahre 1950 im Bereich der Bundesrepublik Deutschland.** [The principal diseases and pests of cultivated plants in the year 1950 in the zone of the Federal Republic of Germany.]—*NachrBl. dtsch. PflSchDienst, Stuttgart*, 3, 10, pp. 149–157, 1951.

The usual lines have been followed in this report on the diseases and pests affecting cultivated plants in Western Germany during 1950 [cf. *R.A.M.*, 31, p.

171]. Among numerous other items may be mentioned *Macrophoma hennebergii* [*Septoria nodorum*] on wheat, prevalent in Westphalia [ibid., 21, p. 306]; *Actinomyces scabies* [cf. ibid., 9, p. 153] and *Clasterosporium putrefaciens* on beet [ibid., 4, p. 391] in the Rhine Province, the latter also in Schleswig-Holstein and Hanover; *Aphanomyces raphani* on radish in Württemberg and Bavaria [ibid., 30, p. 90]; wildfire (*Pseudomonas tabacum*), causing damage on tobacco [ibid., 24, p. 123] for the first time in southern Oldenburg; *Ceratostomella ulmi* on elm [C.M.I. map No. 36] in Schleswig-Holstein and Oldenburg; and very severe infection by *Puccinia tulipae* on tulip [*R.A.M.*, 31, p. 146] in the Steinburg district of Schleswig-Holstein.

KLEMM (M.). **Das Auftreten der wichtigsten Krankheiten und Schädlinge der Kulturpflanzen im Jahre 1950 im Bereich der Deutschen Demokratischen Republik.** [The occurrence of the principal diseases and pests of cultivated plants in the year 1950 in the zone of the German Democratic Republic.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., 6, Supplement, 40 pp., 1 graph, 73 maps, 1952.

In general, the incidence of plant diseases and pests in the zone within the jurisdiction of the German Democratic Republic, covering the provinces of Brandenburg, Mecklenburg, Saxony-Anhalt, Saxony, and Thuringia, was appreciably lower in 1950 than in 1949. Only three new foci of potato wart (*Synchytrium endobioticum*) [cf. above, p. 533] were notified during the year. Beet yellows virus hitherto reported only from Western Germany [ibid., 30, p. 208; and above, p. 535], was observed in a severe to very severe form in Saxony-Anhalt.

SCHREIER (O.). **Das Auftreten wichtiger Krankheiten und Schädlinge an Kulturpflanzen in Österreich im Jahre 1951.** [The occurrence of important diseases and pests on cultivated plants in Austria in the year 1951.]—*PflSchBer.*, 8, 1–2, pp. 15–21, 1952.

The very wet season of 1951 was accompanied even in the drier regions of Austria by severe, early, and extensive outbreaks of fungal diseases [cf. *R.A.M.*, 30, p. 355]. Among those causing excessively heavy losses were vine downy mildew (*Plasmopara viticola*), scab (*Venturia* [*inaequalis* and *V. pirina*]) of pome fruits, and *Monilia* [*Sclerotinia laxa*] on pome and stone fruits.

DYER (R. A.). **Plant classification and control of crop diseases.**—*Fmg in S.Afr.*, 26, 309, pp. 488–490, 1951.

In the botany and plant pathology section of this Annual Report of the Department of Agriculture, South Africa, for the year ended 31st August, 1951 [cf. *R.A.M.*, 30, p. 559], it is stated that diseases of maize included *Fusarium moniliforme* [*Gibberella fujikuroi*: ibid., 26, p. 331] and *Helminthosporium turcicum* [ibid., 18, p. 438; cf. below, p. 550], both prevalent. *Sphacelotheca reiliana* [ibid., 30, p. 607] was severe locally. *Xanthomonas vasculorum* f. *zeae* [ibid., 28, p. 511] was reported from Potchefstroom, and streak disease [maize streak virus: ibid., 31, p. 486] from the Transvaal Highland, near Bethal, and in the Southern Cape, near George. *X. holcicola* [ibid., 29, p. 461] was very troublesome on grain sorghums and Sudan grass in localities including Ventersdorp and Ficksburg. Milo disease [ibid., 23, p. 101] in sorghum plots at Potchefstroom, apparently caused by a complex of *Pythium* and *Helminthosporium* spp. [ibid., 30, p. 565], stalk rot of sorghum [*G. fujikuroi*: ibid., 30, p. 196], and anthracnose (*Colletotrichum graminicola*) [ibid., 30, p. 464] on Sudan grass and to a lesser extent on sorghum were all reported for the first time.

On groundnuts *Botrytis* shoot disease, causing rotting of the nodes and the death of the affected shoots, was observed for the first time late in the season in colder areas. A yellow bacterium, presumably *X. ricinicola* [ibid., 30, p. 542], was

responsible for the serious leaf blight of imported annual castor oil [*Ricinus communis*] plants.

Applications of about 25 lb. urea plus 10 lb. slaked lime or 12½ lb. urea alone in 100 gals. water gave excellent control of citrus die-back [ibid., 30, p. 310] and root rot [unspecified], causing little or no injury to the trees. The time of application is important; treatments given from January to June, when trees are comparatively dormant, are ineffective. A species of *Phytophthora* [cf. ibid., 28, p. 511] responsible for trunk rot of avocado trees is becoming increasingly serious in the Transvaal. Sugar-cane smut (*Ustilago scitaminea*) [ibid., 28, p. 421; 31, p. 475] was reported from a wide area as far north as Umfolozi, affecting mostly the Co 301 variety; roguing is being practised. Pea downy mildew (*Peronospora viciae*) [ibid., 26, p. 1] was very destructive in the Lowveld area. *Phytophthora infestans*, recorded for the first time on tomatoes [ibid., 25, pp. 100, 154] in this area, was also very widespread on potatoes [ibid., 24, p. 115; 28, p. 511]; the B strain of the fungus has appeared on potato varieties like Kennebec, which are resistant to the common A strain.

R. I. Nel (pp. 521–525), dealing with the fruit industry in the winter-rainfall area, reports that in field trials of vines for resistance to bacterial blight (*Erwinia vitivora*) [ibid., 29, pp. 137, 290; 31, p. 473] at Constantia, only Jacquez of the varieties and crosses tested so far has proved highly susceptible. Laboratory and field results indicate that *E. vitivora* remains passive throughout the winter months. Inoculation studies carried out with various bacteria associated with gummosis canker of stone fruits indicated that infection does not occur before June. Apricot freckle blemish, a cause of great concern to growers, was found to be of physiological origin. Studies to determine the host range of the virus causing infectious chlorosis of plums showed that Marianna (*Prunus salicina*), commonly used as rootstock for plums and apricots, is a symptomless carrier of the virus, and that in some varieties of common plum partial masking may occur, the chlorotic symptoms being only faint.

Orian (G.). **Division of Plant Pathology.**—*Rep. Dep. Agric. Mauritius, 1949*, pp. 66–72, 1951; *1950*, pp. 80–85, 1951.

In the 1949 report [cf. *R.A.M.*, 29, p. 351] it is stated that owing to the high resistance of the sugar-cane varieties now grown in Mauritius, gumming disease [*Xanthomonas vasculorum*: ibid., 22, pp. 112, 327], leaf scald [*X. albilineans*: ibid., 22, p. 226], and smut [*Ustilago scitaminea*: ibid., 28, p. 544 and preceding abstract] were becoming very rare. Pineapple disease [*Ceratostomella paradoxa*] was rapidly being reduced through the regular use of aretan at planting time [ibid., 29, pp. 230, 332]. Streak [virus] disease had disappeared with the discontinuance from cultivation of R.P. 8. Chlorotic streak [ibid., 27, pp. 386, 542] caused poor stand and yield in areas of high rainfall and bad drainage where incidence was high. In 1950 there was no important outbreak of any major cane disease, chlorotic streak apparently being at a standstill.

Very few cases of tobacco leaf-curl [virus: ibid., 31, p. 475] were reported in either year [but see ibid., 30, p. 198]. A new type of enation disease not transmitted by grafting was observed in June, 1949, on several tobacco plants at the Richelieu Tobacco Experiment Station.

X. [*Pseudomonas*] *solanacearum* was definitely established as being at least one of the factors causing wilt of filao (*Casuarina equisetifolia*). Spore inoculations supported the view that *Trichosporium vesiculosum* [ibid., 30, p. 638] is a secondary invader. Some cultures from inner bark tissue yielded *Phytophthora cambivora* [C.M.I. map No. 70], a new record for this host and a new fungus record for the island. *Armillaria mellea* caused longitudinal bark splitting of the root and lower stem in young trees at Réduit and Rose Hill.

A gemmiferous fungus similar to that reported from Tanganyika [*R.A.M.*, 28, p. 362] caused leaf spotting and severe defoliation of loquat in 1949.

In 1950 a very severe outbreak of a disease with all the outward symptoms of leaf roll was detected in a potato intercrop planted with South African tubers at Piton in the Rivière du Rempart district.

Mycelium of *A. mellea* was observed beneath the bark of diseased tea plants [ibid., 29, p. 89] received from Savanne and Moka, the base of the trunk and the roots being heavily fissured longitudinally.

A white bacterium was proved by inoculation tests to have caused wilt of onions in Grand Port, characterized by the production of water-soaked lesions on the leaves, rapid shrinking of the tissues, collapse, and death.

The positive identification of halo blight (*Pseudomonas* [*medicaginis* f.sp.] *phaseolicola*) on *Phaseolus vulgaris* [C.M.I. map No. 85] constitutes a new record for the island.

A bad attack of *Septoria lycopersici* [*R.A.M.*, 8, p. 90] occurred on tomatoes at Belle Isle in Black River.

A severe attack of eggplant wilt (*Phomopsis vexans*) [ibid., 30, p. 452] occurred at Crève Coeur.

The following diseases were newly recorded for Mauritius during 1950: cabbage downy mildew (*Peronospora parasitica*) [loc. cit.], scab of wheat and barley (*Gibberella zeae*) [ibid., 30, pp. 265, 482, 560], citrus brown rot (*Phytophthora citrophthora*) [C.M.I. map No. 35], die-back of *Acacia decurrens* caused by *Corticium salmonicolor* (a new host record) [ibid., No. 122), perennial canker of *Pterospermum acerifolium* by *Nectria haematococca*, and collar rot of salsify (*Tragopogon porrifolius*) by *Sclerotium rolfsii*. *Botryosphaeria ribis* attacked the cone scales of *Araucaria cunninghamii* and caused leaf and stem blight of *A. araucana* seedlings; *Phyllosticta antirrhini* [*R.A.M.*, 28, p. 334] caused leaf spot of *Antirrhinum majus*, *Heterosporium tropaeoli* [ibid., 29, p. 564] of *Tropaeolum* sp., *Cercospora calendulae* [ibid., 16, pp. 183, 464] of *Calendula* sp., and *H. eschscholtziae* [ibid., 23, p. 427] of *Eschscholtzia* sp.

[Buckley (T. A.) & Allen (E. F.)]. **Notes on current investigations, April to June, 1951.**—*Malay. agric. J.*, 34, 3, pp. 133–141, 1951.

In inoculation tests in Malaya it was found that the rubber strain of *Phytophthora palmivora* [*R.A.M.*, 30, p. 541] penetrated beyond the point of inoculation in cacao pods and plants. It is quite probable, therefore, that cacao will suffer damage when the area under this host extends into the neighbourhood of rubber on low-lying ground where black stripe is prevalent.

Potted oil palm seedlings [*Elaeis guineensis*] were inoculated in the crown with a *Helminthosporium* sp. [ibid., 30, p. 509] which had attacked this host on one estate. The fungus developed and the seedlings died in two months when the pots were watered weekly but not when watered daily. Those which did not receive adequate water and were not inoculated survived in spite of the older leaves withering. Therefore it is expected that the disease will be prevented in the field by conservation of moisture in the soil.

Young Napier grass [*Pennisetum purpureum*] was heavily attacked by blast (*Piricularia* sp.) [loc. cit.] in plots manured with nitrogenous fertilizer. The later growth and grass in unmanured plots were free from attack.

Report of the Division of Mycology and Plant Pathology.—*Sci. Rep. agric. Res. Inst. N. Delhi, 1948–1949*, pp. 177–190, 1951.

In this report [cf. *R.A.M.*, 30, p. 601] it is stated that of 81 wheat varieties inoculated with loose smut (*Ustilago tritici*) [ibid., 31, p. 428] and sown at New Delhi, 67 failed to become infected with race L_1 and 58 did not become infected with L_2.

Of 126 varieties inoculated with a mixture of L_1 and L_2, 99 did not become infected. Of 43 C.P. varieties inoculated at Hoshangabad, with a local collection of *U. tritici*, 31 did not take infection.

In 1947–8 oat leaf spot (*Helminthosporium* [*Pyrenophora*] *avenae*) occurred in epiphytotic form in the vicinity of New Delhi. Primary infection increases with reduction of temperature, plants sown early developing less infection than those sown late. Incidence of primary infection is higher in 25 per cent. soil moisture than in 50 per cent. Optimum temperature for growth lies between 18° and 24° C. at pH 6. *Phalaris minor* and *Avena fatua* are collateral hosts, and self-sown oats also harbour the disease from August to October. Victoria was highly resistant. Treatment with agrosan GN controlled primary infection.

Fusarium wilt of lentils [ibid., 28, p. 6] occurs in November and from February to April, reaching an optimum in March. The disease was successfully reproduced by inoculation with *F. orthoceras* isolated from infected material. The fungus grew best at 27° to 30° and pH 5, and more rapidly on sand than on soil. Maximum infection occurred in pots maintained at 25 per cent. water-holding capacity; at saturation no disease resulted.

In 1948–9, 107 sugar-cane varieties, comprising some 4,500 canes, were tested by the standard plug method for resistance to red rot (*Colletotrichum falcatum*) [*Physalospora tucumanensis*: ibid., 31, p. 400], using a virulent strain. *S. spontaneum* (Glagah, Java), *S. spontaneum* (Coimbatore), S.G. 851, Chunnee, and Co. 301, 393, 408, 411, 413, 440, 627, and 631 were highly resistant [cf. ibid., 30, p. 630]. Some varieties susceptible to linear spread of infection showed considerable resistance to infection through the nodes [loc. cit.]. When 2,500 canes were inoculated at the nodes 32 varieties developed under 5 per cent. infection.

Of 96 parent cane varieties tested for resistance to smut (*U. scitaminea*) [ibid., 30, p. 601, and above, p. 537] at Kamal in 1948–9, 53 showed under 5 per cent. infection and may be regarded as highly resistant; at Delhi, of 31 varieties tested Co. 631, 639, 641, 642, 643, 645, 653, 655, and 656 were in the same category. The average weight of millable canes per clump affected by smut was 1·63 lb., as against 2·64 lb. per healthy clump.

Four physiologic races of flax rust (*Melampsora lini*) [cf. ibid., 19, p. 583; 28, p. 627] have been reported in India. In a test with mixtures of the four races, 70 of 125 linseed varieties were found to be resistant. Two types of linseed wilt were observed: one, occurring early in the season, is marked by yellowing and withering of the leaves, stunting, and partial or entire discoloration of the root system. The other appears later and is accompanied by a dark brown discoloration; the bark of the root peels off and small sclerotia are present on the bark, wood of the root, and basal portions of the stem. It is associated with *Macrophomina phaseoli* [ibid., 14, p. 560].

Rust (*Uromyces trifolii*) [ibid., 31, p. 387] is very prevalent on cultivated clover (*Trifolium resupinatum*), the crop at the farm of the New Delhi Research Institute having up to about 80 per cent. infection. Under suitable conditions the uredospores germinate within 2½ hours. The optimum temperature for germination lies between 18° and 20°. In infected material stored at 8° to 10° the fungus remained viable for about 40 weeks, though at 60° viability was lost in four days. At 30° teleutospores were produced instead of a second generation of uredospores, the latter losing their viability in the summer heat. Inoculations of seven species of *Trifolium* resulted in the infection of *T. glomeratum* only. Newly formed teleutospores failed to germinate. Inoculations with teleutospores gave rise to pycnidia and aecidia after nine and 12 days, respectively.

F. orthoceras var. *pisi* [cf. ibid., 30, p. 361 *et passim*] caused serious wilt of peas; incidence was highest in sandy soils and at 60 per cent. soil moisture. A preliminary test indicated that infection may be reduced by the addition of farmyard manure.

Twenty-one potato varieties were tested for resistance to the storage rot fungi, *F. solani* [ibid., 26, p. 45], *Rhizoctonia bataticola* [*M. phaseoli*: ibid., 11, p. 126], and *R.* [*Corticium*] *solani* [ibid., 16, p. 231], individually and mixed. Culture 301 appeared to be resistant to all these fungi; hybrid 10 was resistant to single fungi, but developed 33·3 per cent. infection when inoculated with a mixture of all three.

Tomato seedling damping-off (*Pythium debaryanum*) was controlled to an appreciable extent by steeping the seed in 10 per cent. copper sulphate solution for half to one hour and disinfecting the soil with formaldehyde.

Of 19 pigeon pea varieties tested, N.P. 41, Co. 15, W. Exp., Very Early, C. 38–3–1, and N.P. 69 × U.P. 132-f.4–18 B appeared to be resistant to wilt (*F. udum*) [ibid., 30, p. 510]. Of all the micro-organisms isolated *Bacillus subtilis* [ibid., 29, p. 624; 31, p. 515] appears to be chiefly responsible for the inhibition of *F. udum*. The importance of manganese, magnesium, and iron in the production of the antibiotic was demonstrated, while zinc in the presence of iron appeared to retard it. The antibiotic substance produced in soil-maize medium inhibited the growth of *F. udum* in soil columns.

In seed treatment tests ceresan, agrosan GN, and spergon increased germination of maize by 10, 9, and 5 per cent., respectively, while agrosan GN increased germination of jowar [sorghum] and bajra [*Pennisetum typhoides*] by 16 and 15 per cent., respectively. Increase in percentage maize yields calculated on a basis of ear weight was 13·5 with agrosan GN. Incidence of oat covered smut [*Ustilago kolleri*: ibid., 30, p. 248] was nil in a crop raised from inoculated seed treated with ceresan, aagrano, or agrosan GN, whereas infection from untreated seed reached 17 per cent. Seed treatment of barley with ceresan increased yield by 8·5 per cent.

Potato blight [*Phytophthora infestans*: ibid., 31, p. 572] caused serious crop loss throughout the Simla Hills region in 1948–9. At Kufri perenox and Burgundy mixture were both effective against the disease, but dithane alone or with zinc sulphate and lime failed to give control. Experimental evidence showed that infection of 95 to 100 per cent. of the leaf area reduced yield by 50 per cent., while 25 to 50 per cent. infection reduced it by 21 per cent.

In the local wheat variety Agra, 75 and 90 per cent. infection by black rust [*Puccinia graminis*: ibid., 31, p. 428] reduced yield by 26·6 and 55·6 per cent., respectively; with N.P. 4, 50 and 90 per cent. infection resulted in 20 and 38·7 per cent. reduction, respectively.

On vaselined glass slides exposed in an aeroscope about 3 ft. above the ground for periods of one week *Uromyces* spores were common in December. Viable uredospores of *Melampsora lini* and *P. glumarum* were first trapped during the week ending 3rd January, 1949, and those of *P. glumarum*, *P. rubigo-vera* [*P. triticina*], and *P. graminis* in the following week. An outbreak of *P. glumarum* on the local wheat crop followed on 24th January. From February to April rust and smut spores were common. Spores of the loose smuts of wheat, oats [*Ustilago avenae*: ibid., 21, p. 327], and barley [*U. nuda*: ibid., 29, p. 555], and covered smut of oats lost their viability at 41°, 43°, 43°, and 45°, respectively, when exposed for four hours in the presence of moisture. Spores of barley covered smut [*U. hordei*: ibid., 30, p. 405] lost their viability at 45° to 47°, and those of grain smut of sorghum [*Sphacelotheca sorghi*: ibid., 31, p. 380] at 49° to 50°.

There was no change in the virulence of tomato leaf-curl virus [cf. ibid., 30, p. 348] after passage through *Datura stramonium*, though it tended to diminish after passage through chilli and *Solanum nigrum*. The change appeared to be permanent, as tomato shoots containing the attenuated and unattenuated virus when grafted on healthy tomato produced mild and severe curl, respectively. When cut ends of severely affected tomato shoots were dipped in healthy leaf extract of *S. nigrum* and grafted to healthy tomato plants they developed very mild symptoms, whereas new growth from comparable grafts previously kept in water was severely curled.

Bismark potatoes grown in a glasshouse displayed stunting of the apical shoots with downward curling of the leaf tips and outward or inward curling of the margins due to *Nicotiana* virus 10 [tobacco leaf-curl virus: see above, p. 537]. *Shizanthus* sp. also proved to be a host of this virus [ibid., 28, p. 597].

Leaves of *Hibiscus rosa-sinensis* affected by a leaf-curl virus at first display faint mottling; leaf size is reduced and vein thickening usually present. Subsequently, enations develop on the veins on the lower surface. Puckering is common and the margins may curl upwards. The condition is not sap-inoculable, but is readily graft-transmissible. The virus appears to have a wide host range, including bhendi [*H. esculentus*] and cotton.

On pp. 155–156 of this report S. C. Das states that examination of the soil from the root zones of gram (*Cicer arietinum*) plants with top yellowing and bronzing [ibid., 28, p 335] indicated a high salt content, as compared with soils from healthy plants. Responses to diagnostic injections and spray applications of trace elements indicated that citrus plants were affected by manganese, zinc, and copper deficiencies at Kutta and Tittimati (Coorg), by manganese and zinc deficiencies at Hoddur and Horadur, and by iron deficiency at Horadur.

Annual Report of the Agricultural Experiment Stations, Florida, for the year ending June 30th, 1950.—263 pp., 33 figs., 4 graphs, 1 diag., [? 1951].

In this report [cf. *R.A.M.*, 30, p. 452] E. West states that the suspected causal organisms of *Camellia* die-back, *Gloeosporium* sp. and *Phomopsis* sp. [ibid., 29, p. 87], were isolated from new flower and vegetative buds as early as 4th August, indicating that infection takes place during the preceding rainy season. *Camellia* root disease (*Phytophthora cinnamomi*) [ibid., 30, p. 452], which is widely distributed in Florida, caused over 50 per cent. loss in 24 months in one planting of well-rooted cuttings in newly cleared pine land. The disease was controlled in potted seedlings by soil drenching with 8-copper quinolinolate solution.

P. Decker reports that a sap-transmissible disease apparently of virus origin was observed in yellow lupins in early autumn and later in sweet and bitter blue at Gainesville, Quincy, and Jay. The disease markedly reduced plant growth and may eliminate seed set [cf. ibid., 31, p. 241].

In 1949 J. R. Large found that against pecan scab [*Cladosporium effusum*: ibid., 30, p. 452] two applications of Bordeaux mixture, followed by two of 2–100 ziram were more effective than the standard Bordeaux mixture schedule, but in 1950 infection, which appeared about 15th May, was equally severe on both unsprayed and sprayed trees. Properly applied, Bordeaux spray controlled nursery blight (*Elsinoe randii*) [ibid., 21, p. 55].

In fungicide tests by A. H. Eddins against cabbage and cauliflower downy mildew [*Peronospora parasitica*: ibid., 30, p. 452] 50 per cent. of the foliage of untreated plants was destroyed, as against only 7 per cent. in plots sprayed with spergon and double strength nabam-zinc sulphate (4 lb.–2lb.–100 gals.). Losses due to *Alternaria oleracea* [*A. brassicicola*: loc. cit.] were confined almost completely to fields planted with infected stock from Georgia and to those irrigated frequently during dry periods. When grown in soil infected with cabbage yellows (*Fusarium oxysporum* f. *conglutinans*) [*F. conglutinans*: ibid., 30, p. 453; 31, pp. 312, 362] 55 per cent. of the plants of the susceptible cabbage variety Glory of Enkhuizen became affected; Resistant Detroit, Resistant Premier, and Resistant Glory had, respectively, 8·7, 7·3, and 1·8 per cent. infection, Resistant Medium Copenhagen Market alone remaining healthy. Of 209 cauliflower plants grown in 1950 in soil which had given 100 per cent. infection of cabbage black rot (*Xanthomonas campestris*) [ibid., 31, p. 96] in 1948, none developed the disease. Ten plants of each of 67 selections of early, mid-season, and late varieties of cabbage, inoculated when half grown with a water suspension of the bacteria, all became infected, the disease

progressing more rapidly in early than in late varieties. Red Acre D 100·3, Penn State Ballhead C 50833, All Head Select 78251, Wisconsin Bugner, Florida Danish G 103·1, and Savoy Perfection Drumhead S 90550 were resistant.

D. G. A. Kelbert and J. R. Beckenbach report that weather conditions at the Vegetable Crops Laboratory farm favoured a severe outbreak of maize leaf blight (*Helminthosporium turcicum*) [ibid., 31, p. 325 and above, p. 536]; Huron, K.V.F. 47–10, Aristogold Bantam Evergreen, Peoria, Dixiana, Dixie Gold, and Calumet showed some resistance. In a cucumber variety trial for resistance to downy mildew [*Pseudoperonospora cubensis*: ibid., 30, p. 443] the most resistant was Palmetto [ibid., 30, p. 505].

J. M. Walter, J. R. Beckenbach, and D. G. A. Kelbert state that tomato hybrids have been produced which possess a combination of resistance to *Fusarium* wilt [*F. bulbigenum* var. *lycopersici*: ibid., 31, p. 462], *Alternaria* diseases [*A. solani* and *A.* spp.], grey leaf spot [*Stemphylium solani*], leaf mould [*Cladosporium fulvum*], tobacco mosaic [virus], *Phytophthora infestans* [ibid., 30, p. 634; 31, p. 520], and *Phoma* rot [*P. destructiva*]. In a preliminary spraying test with 20 fungicides on Manasota tomatoes conducted by J. M. Walter and J. R. Beckenbach phygon XL (2 lb. per 100 gals.) was effective against *S. solani* [ibid., 29, p. 87; 31, p. 303], *C. fulvum* [ibid., 27, pp. 164, 174], *P. destructiva* [ibid., 17, p. 139; 30, p. 453], and *A. solani* [loc. cit.; ibid., 31, p. 520]. R. A. Conover states that in a spraying trial at the sub-tropical station, Homestead, Missouri S–34 tomatoes proved very susceptible to late blight, which, present throughout the tests, was the only serious disease that affected the plants, and was almost entirely responsible for the reduced yields resulting from ineffective treatments. Dithane Z 78, dithane Z 78 M6A, parzate, dithane Z 78 M4A (all at 2 lb. per 100 gals.), and phygon XL (0·75 lb.) gave, respectively, 0, 0·27, 0·1, 0·42, and 0·08, per cent. affected fruits, and total yields of 523, 471, 475·4, 455·4, and 441·8 bush. per acre of mature-green fruit, the corresponding figures for the untreated being 28·24 per cent. and 57·4 bush. per acre.

R. O. Magie found that dusting *Gladiolus* corms with spergon immediately after cleaning gave the best protection against *F. oxysporum* f. *gladioli* [ibid., 31, p. 435].

Greenhouse studies by G. K. Parris confirmed the view that only one physiologic strain of the watermelon anthracnose fungus (*Colletotrichum lagenarium*) [ibid., 29, p. 454; 30, p. 180; 31, p. 166] exists; apparent disparities in varietal susceptibility observed in 1947–8 were due to differences in the virulence of cultures. Good control of downy mildew [*Pseudoperonospora cubensis*: ibid., 30, pp. 302, 451] was given by spraying with dithane Z 78 (2 lb. per 100 gals.), parzate (1½ lb.), or phygon XL (½ lb.). Preliminary work indicated that watermelon mosaic [ibid., 28, p. 504; 29, p. 75; 31, p. 368] is probably due to the southern celery mosaic strain of cucumber mosaic virus [ibid., 14, p. 4].

H. J. Reitz, J. W. Sites, W. L. Thompson, I. W. Wander, and A. E. Willson consider that 25 p.p.m. boron in mature citrus leaves should be taken as the limit below which there is a deficiency [cf. ibid., 29, p. 24]. Lack of agreement between symptoms and the results of analysis [cf. ibid., 31, p. 237] indicates that individual symptoms are not specific for boron. Boron deficiency is more likely to occur in trees on sour orange than on grapefruit or rough lemon rootstocks [cf. ibid., 26, p. 485]. In a pot experiment one-year-old rough lemon seedlings showed the best growth response after 12 months in soil not before planted with citrus, the next best in soil from an area affected by spreading decline [ibid., 29, p. 88] with crystal violet added at a rate equivalent to 250 lb. per acre, and the poorest in untreated soil from the same area. R. F. Suit, L. C. Knorr, and H. W. Ford state that spreading decline offers a serious threat to citrus production; affected areas have increased in size and additional groves have been attacked. The rate of spread in 20 groves averaged 1·47 trees per row on the margin of the declining area in one

year from 1st June, 1949, as compared with 2·68 trees in the same groves for the corresponding period in 1948–9. In 23 groves in which the citrus nematode (*Tylenchulus semipenetrans*) was present, observed over a period of years, symptoms were different from typical spreading decline occurring in groves from which the nematode was absent. The evidence indicates that spreading decline is not caused by a nematode. Cultures of *F.* spp. were readily isolated from the fibrous roots of affected trees; toxic materials extracted from the roots and leaves and also produced by the growth of the *F.* spp. in a modified Richards's solution both caused wilting of citrus and tomato cuttings. E. F. Hopkins and K. W. Loucks report that excellent control of citrus fruit decay [ibid., 31, p. 430] was obtained when Hamlin, Parson Brown, Pineapple, and Valencia oranges, some of which had previously been gassed with ethylene, were immersed in dowicide A plus hexamine (1·5 plus 0·75 per cent. and 2 plus 1 per cent.) for one or two minutes at 80° or 100° F. After two weeks' storage the untreated fruits had developed 20·4 per cent. total decay, as against 1·8 per cent. for 1 minute treatment at the higher concentration and temperature and 1·5 per cent. for 2 minutes. After three weeks the degree of control was less. Stem-end rot (*Diplodia natalensis*) [and *Diaporthe citri*: ibid., 30, p. 454] after three weeks was 38 per cent. in the untreated and 11·3 and 10·1 for the two treatments indicated above, respectively, corresponding to 69 and 71 per cent. control, respectively. In an attempt to improve control oranges after treatment were packed in box liners impregnated with phenodor X (a commercial preparation containing diphenyl, oil, wax, and an odour counteractant). After two weeks' storage decay was reduced by 94 per cent., and after three by 91 per cent. Similar results were obtained using phenodor X fibreboard cartons.

The celery strain 45–219–3 selected in vegetable variety trials by W. A. Hills and E. A. Wolf for resistance to early blight (*Cercospora apii*) [ibid., 30, p. 453] and other desirable characteristics is being increased by seed companies and may soon be released for commercial use.

Work by W. N. Stoner and W. D. Hogan on sclerotiniose disease of vegetables [*Sclerotinia sclerotiorum*: ibid., 31, p. 292] indicated that flooding with moving water in rice culture rots sclerotia more rapidly than does flooding with static water. After two weeks' coverage 90 per cent. of the sclerotia buried three inches deep under rice grown in moving water were destroyed. Observations by R. A. Conover in tomato fields, where the disease was severe, supported the results of laboratory studies, indicating that flooding for three to four weeks is necessary for the destruction of the sclerotia.

R. R. Kincaid reports that bacterial (Granville) wilt of cigar-wrapper tobacco [*Pseudomonas solanacearum*: cf. ibid., 31, p. 33] occurs in various parts of Florida and kills over 40 per cent. of the plants in certain parts of shades. In tests made in co-operation with W. H. Sachs of the Du Pont Company in 1950 and earlier years satisfactory and economical control was generally obtained with uramon [ibid., 26, p. 333] broadcast and mixed with the soil at the rate of 1,000 to 2,000 lb. per acre in October.

Lee (A. E.). **Nitrogen and amino acids in normal, habituated, and bacteria-free crown gall tumor tissue cultures of Grape.**—*Plant Physiol.*, 27, 1, pp. 173–178, 1952.

At the Plant Research Institute, University of Texas, Austin, stocks of normal, habituated, and bacteria-free crown gall [*Bacterium tumefaciens*] tumour tissues of Aramon vine, received from the Plant Pathology Laboratory, Versailles, France [*R.A.M.*, 29, p. 167; 30, p. 144], were subcultured through several passages in Gautheret's standard agar medium plus 3 per cent. glucose [cf. ibid., 26, pp. 238, 442; 27, p. 329] (with the addition to the normal tissue of 5×10^{-8} gm. per l. naphthalene acetic acid) and grown on it for 40 days prior to chemical analysis.

The bacteria-free crown gall tissue contained the highest percentage of total nitrogen (average of four samples 2·48 per cent.) and crude protein (13·9) and the normal the lowest (1·36 and 7·62, respectively), the habituated being intermediate (1·51 and 8·44). The soluble nitrogen followed the same pattern but the differences between the three were slighter. The percentage of total phosphorus was highest in the bacteria-free tissue (0·78), with 0·49 and 0·44 in the habituated and normal. Percentage dry weight of the habituated tissues was 10·5, the normal 7·7, and bacteria-free 5·6. It is suggested that the metabolic differences may involve factors related to the ratio of protein synthesis to structural carbohydrate synthesis. The amino acids of the three tissue types are essentially similar.

Lioret (C.). **Échanges gazeux respiratoires des tissus de crown gall de Scorsonère (Scorzonera hispanica L.) cultivés in vitro en présence d'acide 2-naphtalène acétique.** [Respiratory gaseous exchanges in crown gall tissues of *Scorzonera* (*Scorzonera hispanica* L.) cultured *in vitro* in the presence of dinaphthalene acetic acid.]—*C.R. Acad. Sci., Paris*, 234, 2, pp. 237–239, 1 graph, 1952.

Dinaphthalene acetic acid at concentrations of 10^{-8} and 10^{-6} inhibited the growth and gaseous respiratory exchanges of *Scorzonera hispanica* in pure cultures of tissues attacked by crown gall [*Bacterium tumefaciens*: *R.A.M.*, 29, p. 408].

Richardson (J. K.). **A simple nephelometer.**—*Phytopathology*, 42, 3, p. 171, 1 diag., 1952.

In the course of potato scab (*Actinomyces scabies*) investigations at the Laboratory of Plant Pathology, St. Catharines, Ontario, a study was made of the microflora of soils in which different percentages of infection occurred on the tubers. Visual estimates of fungal and actinomycetous growth in a series of differential media were reasonably accurate and rapid, but the determination of variations in turbidity in bacterial cultures was much more difficult. The problem was solved by the photometric measurement of turbidity by means of a simple apparatus. A block of wood, 4 by 4 by 3 in., is attached to the lens tube of a microscope lamp, the culture is inserted in a vertical hole in the block, and the light passing through a horizontal hole in the block and through the tube is measured by a photo-electric exposure meter placed in front of the block, the turbidity being compared with non-inoculated medium, using the same test-tube. A second test-tube hole in the block is for the use of a compensating blank when media of different colours are being used.

Patel (M. K.), Kulkarni (Y. S.), & Dhande (G. W.). **Two new bacterial diseases of plants.**—*Curr. Sci.*, 21, 3, pp. 74–75, 1952.

In 1949 *Xanthomonas clerodendri* n.sp. was found to be the agent of a leaf spot of *Clerodendron phomoidis*, a medicinal plant which is also relished by livestock, at Kirkee [Bombay]. It is a Gram-negative, capsulated, non-spore-forming rod, occurring singly or in chains; on potato dextrose agar the pale lemon-yellow colonies are circular, with entire margins, measuring 1·8 cm. in diameter after seven days; gelatin is liquefied, starch hydrolysed, casein digested, milk peptonized, litmus but not nitrates reduced, ammonia and hydrogen sulphide formed, and acid but no gas produced from dextrose, sucrose, and lactose; the optimum temperature for growth is about 31° C. and the thermal death point near 51°.

The irregular, watersoaked spots on the lower leaf surface tend to coalesce in the later stages of infection, forming angular lesions 4 mm. in diameter, while the corresponding areas on the upper surface turn brown to dark brown. The centres of the spots are often thin and parched and the leaves slightly crinkled. Pearly beads of exudate develop on the lower surfaces.

X. sesbaniae n.sp. was responsible for a new disease of *Sesbania aegyptiaca*, a shrub used as fodder and for windbreaks, etc., on the Agricultural College Farm, Poona, in 1949. The single or concatenate, Gram-negative, capsulated, non-spore-forming rods measure 1·3 by 0·7 μ; on potato dextrose agar the striate, barium-yellow colonies attain a diameter of 2 cm. in seven days; gelatin is liquefied, casein digested, milk slightly peptonized, litmus but not nitrates reduced, ammonia and hydrogen sulphide formed, and acid but no gas produced from dextrose, sucrose, and lactose; the optimum temperature for growth is 31° and the thermal death point near 51°.

The circular, watersoaked spots, 0·5 to 1 mm. in diameter, on the lower leaf surface are surrounded by a halo 1·5 to 2 mm. in diameter. On the upper surface the corresponding areas become chlorotic with brown centres. In severe cases the entire leaflet turns yellow and finally drops. Vertical, greyish streaks, 4 mm. in length, develop on the stem, while similar lesions, up to 3 mm. long, appear on the rachis, their centres often exuding pearly, gummy beads. The leaf margins are also involved.

Bhide (V. P.), Moniz (L.), & Patil (R. B.). **Actinomycetes antibiotic to plant-pathogenic bacteria.**—*Curr. Sci.*, 21, 3, pp. 70–71, 1952.

At the College of Agriculture, Dharwar, India, 64 actinomycetes isolated from Karnatak soils were tested on a modified Czapek's medium against 20 species of *Xanthomonas*. Only seven of the isolates were antibiotic to three or more of the bacteria, among which *X. campestris* and *X. malvacearum* were completely inhibited by four and partially by two. *X. desmodii-gangeticii* [*R.A.M.*, 29, p. 145] was partially inhibited by all seven cultures, *X. uppalii* [ibid., 28, p. 622] and *X. ricinicola* each by six, *X. vignicola* [ibid., 31, p. 45] and *X. vesicatoria* [ibid., 29, p. 406] each by five, *X.* [*phaseoli* var.] *sojense* [ibid., 28, p. 404], *X. alfalfae* [ibid., 29, p. 406], and *X. cajani* [ibid., 31, p. 6] each by three, *X. desmodii* [ibid., 30, p. 232] and *X. poinsetticola* [ibid., 31, p. 479] each by two, and *X. citri* [ibid., 30, p. 263], *X. badri*, *X. betlicola* [ibid., 31, p. 107], *X. stizolobiicola* [loc. cit.], *X. lawsoniae* [ibid., 31, p. 479], and *X. tamarindi* [loc. cit.] each by one.

Bazán de Segura (Consuelo). **Escoba de brujas del Çacao en Bagua.** [Witches' broom of Cacao in Bagua.]—*Bol. Estac. exp. agríc. Lima* 44, pp. 1–9, 6 figs., 1952. [Mimeoprinted.]

In connexion with the recent discovery of heavy losses (up to 100 per cent.) in the cacao crop due to witches' broom (*Marasmius perniciosus*) [C.M.I. map No. 37; *R.A.M.*, 30, p. 27] in the environs of Bagua Chica, Amazonas, Brazil, the writer summarizes the available information on history, geographical distribution, etiology, and control of the disease. It is recommended that brooms should be excised on the lines advocated by Baker [ibid., 20, p. 453] and in addition that Bordeaux mixture be applied at a strength of 1 per cent., starting with the resumption of growth after dormancy.

Machacek (J. E.). **Tests of newer seed treatments—1951.**—*Plant Dis. Reptr*, 36, 5, pp. 178–179, 1952. [Multilithed.]

In the 1951 field seed treatment tests at 22 stations in Canada and the United States seed of Red Bobs wheat, artificially contaminated with mixed spores of bunt (*Tilletia caries* and *T. foetida*) [*R.A.M.*, 31, pp. 177, 234, 428] (1 part by weight spores to 200 parts seed), Vanguard oats naturally infected with smuts (*Ustilago avenae* and *U. kolleri*) [ibid., 31, pp. 178, 233] with further artificial contamination (1 to 400), Sanalta barley naturally infected with *U. hordei* and *U. nigra* [loc. cit. and ibid., 30, pp. 516, 603], Regent wheat with *Helminthosporium sativum* [ibid.,

31, p. 179] (75 per cent. of the kernels), and Royal flax, 50 per cent. of the seeds of which had been cracked during threshing, were treated with nine different commercial fungicides. Ceresan M dust and slurry (both at 0·5 oz. per bush.), agrox C dust (1), mergamma C dust and slurry (1·66), agrox slurry (0·5), agrosan C slurry (1), mergamma slurry (1·66), and P.M.A.S. fluid (0·5 and 0·75) gave 0·5 per cent. or less smutted heads in wheat and oats, while agrox dust (0·5 oz.) and mergamma dust (1·66) reduced the percentage in wheat and oats and leytosol C (wet at 0·5 oz.) in wheat to 0·9 or less, the incidence in untreated wheat and oats being 45 and 17·1 per cent., respectively. All the fungicides increased the percentage germination of Regent wheat from 60·6 (untreated) to between 65·1 and 80·4 (ceresan M dust) and all except bunt-no-more dust of Royal flax from 38·7 (untreated) to between 43·5 and 51·1 (P.M.A.S. fluid at 0·75 oz.). None of the treatments reduced barley smut to less than 1·4 per cent. (P.M.A.S. fluid at 0·75), the control having 10·9 per cent.

Conference on cereal rust.—*Countryman, Nicosia*, 6, 3, p. 17, 1952.

This is a very brief account of a conference on cereal rusts [*Puccinia* spp.] in the eastern Mediterranean held in Nicosia, Cyprus, during the last week of March, 1952. It was called by the Middle East Science Co-operation Office of the United Nations Educational, Scientific, and Cultural Organization with the participation of the Food and Agriculture Organisation.

Rusts are among the worst diseases of cereals in the Middle East. The most serious in Cyprus is stem rust [*P. graminis*: *R.A.M.*, 31, p. 109], which causes losses of up to 20 per cent. of the crop valued at £1,500,000.

Itô (K.). **Immunity of the gramineous plants to the violet root rot.**—*Agric. & Hort., Tokyo*, 27, pp. 85–86, 1952. [Japanese.]

In two years' field inoculation tests maize, upland rice, wheat, and millet [? *Panicum miliaceum*] remained free from infection by *Helicobasidium mompa* [*R.A.M.*, 30, p. 337], but soy-bean and sweet potato were severely attacked. When the fungus is inoculated into gramineous seedlings under aseptic conditions it can penetrate the younger but not the older roots. Even in the younger seedling roots, however, the hyphae soon become enclosed in the subepidermal tissues in consequence of the rapid lignification or gummosis of the tissues following contact with the invading hyphae. A similar phenomenon is also observed in sweet potatoes, but the hyphae can traverse the enclosure and develop further. The immunity of gramineous plants from the violet root rot fungus seems to be due to a hypersensitive necrosis of the invaded cells.

Briggs (F. N.). **Registration of improved Wheat varieties, XIX.**—*Agron. J.*, 44, 3, p. 155, 1952.

Since the publication of the last report on the registration of wheat varieties [*R.A.M.*, 30, p. 220], the mid-season winter Kiowa, Reg. No. 346, has been approved. Originating at the Kansas Agricultural Experiment Station, it is resistant to bunt [*Tilletia* spp.] and tolerant of stem rust [*Puccinia graminis*], but highly susceptible to loose smut [*Ustilago tritici*] and susceptible to leaf rust [*P. triticina*].

Pesola (V. A.) & Honkavaara (T.). **Apu-Kevätvehnä uusi, aikanen Kevätvehnälajike.** [Apu Wheat, a new Finnish early spring Wheat variety.]—*Valt. Maatalousk. Tiedon.* 228, 12 pp., 2 figs., 1952. [English summary.]

The early, prolific, awned wheat variety Apu (Jo 08590), derived from a cross between Canadian Garnet and Pika (Tammisto Experiment Station, Finland), is

fairly resistant to yellow and brown rusts (*Puccinia glumarum* and *P. triticina*) [*R.A.M.*, 31, p. 481] and foot rot [unspecified], but moderately susceptible to stem rust (*P. graminis*) and loose smut (*Ustilago tritici*).

WAGNER (F.). **Neue Ergebnisse zur Bekämpfung des Zwergsteinbrandes.** [New results in dwarf bunt control.]—*Z. PflBau*, 3 (47), 2, pp. 84–89, 1952.

Further experiments were performed in 1950–1 at Munich and Bayreuth, Bavaria [cf. *R.A.M.*, 30, p. 30], to determine the efficacy of three dusts, an [unnamed] mercurial, tritisan [ibid., 31, p. 26], and brassicol [loc. cit.], in the control of wheat bunt [*Tilletia caries*] and dwarf bunt [*T. caries* or *T. brevifaciens*: ibid., 31, p. 378]. At Munich, using the seed infection method, common bunt was reduced from 23·1 to 0·5 per cent. diseased ears by the mercurial at a dosage of 200 gm. per 100 kg. and to 0 by tritisan (20 to 100 gm. per 100 kg.) and brassicol strewn over the seed at 20 gm. per sq. m. or applied with the seed in the drill at 10 kg. per 100 kg. The corresponding figures at Bayreuth were 24, 0·37, 0, 0·11, and 0, respectively. Using the soil infection method infection of ears in the control plots at the two places was 49·1 and 24·32 per cent., respectively; in those dusted with the mercurial 50·5 and 21·76; and in those treated with 20, 40, 60, 80, and 100 per cent. tritisan 1·5 and 0·6, 0·4 and 0·3, 0·2 and 0·23, 0 and 0·07, and 0 and 0·04; strewing and drilling with brassicol eliminated every trace of bunt.

In parallel bunt and dwarf bunt tests with the same fungicides the bunted ear percentages resulting from the seed infection method in the untreated plots were 1·26 and 0·3, respectively, in the mercury-dusted 0·15 and 0·19, and in all the others nil (except for common bunt with 40 per cent. tritisan, 0·19). For soil inoculations the percentages were as follows: untreated 7·2 and 0·75, respectively; mercurial dust 3·07 and 2·89; 20, 40, 60, 80, and 100 per cent. tritisan 0·07 and 2·64, 0·15 and 0·71, 0 and 0·41, 0 and 0·26, and 0 and 0·15; and brassicol (both methods of application) nil.

The foregoing data are based on threefold replicated experiments in 3-sq.m. plots, and a further six trials were carried out on farms in the contaminated area. The numbers of bunted ears per 50 m. drill row length in the untreated plots and in those dusted with the mercurial, 20 per cent. tritisan, and brassicol (applied with the drill) were 33·5, 10·9, 8·9, and 7·5, respectively, the corresponding figures for dwarf bunt being 70·7, 54·3, 44·4, and 33·2. Since dwarf bunt appears to represent a response of *T. caries* to many years of seed treatment, its further extension may be expected unless the present system of disinfection by 'universal' preparations is replaced by the use of specifics against bunt. Particularly serious is the risk of spread through combine-harvesting, which scatters the spore masses over the surrounding fields where they serve to infect the following autumn-sown crop.

SEMPIO (C.). **Difesa, predisposizione e malattia intese come squilibri funzionali (con particolare riguardo a studi compiuti sul Frumento).** [Defence, predisposition, and disease interpreted as functional disequilibria (with special reference to studies accomplished on Wheat).]—*Phytopath. Z.*, 17, 3, pp. 287–292, 1950. [German summary. Received April 1952.]

Further studies were carried out at the Institute of Plant Pathology, University of Perugia, Italy, on the changes in equilibrium between photosynthesis and respiration induced by disease, with special reference to the 'wheat-*Oidium* [*Erysiphe graminis*] complex' [*R.A.M.*, 28, pp. 330, 351; 31, p. 484]. Taking the arbitrary ratio of photosynthesis to respiration in healthy plants to be as 1:1, the values for tissues in states of predisposition, defence, and disease were found by experiments [not described here] to be, respectively, 1·2:1·65 (= 0·72 or varying between 0·3 and 0·8), 1·75:1·2 (= 1·47 or 1·2 to 1·8), and 0·4:3·8 (= 0·1)

for *E. graminis* and 2·5 or 3·1 for potassium-deficient wheat [ibid., 28, p. 329]. In other words, tissues in which photosynthesis is less intense than respiration (in relation to the normal) are in a state of metabolic predisposition, while a reversal of these intensities connotes a state of defence. In both cases, however, it is a question of only moderately severe functional disturbances of equilibrium, generally transient and lying within the normal framework of metabolism. When parasitic or non-parasitic diseases are present the disturbances, whether they result in an excess of photosynthesis over respiration or vice versa, are on the contrary both intense and irreversible.

Bockmann (H.). **Über die Halmbruchkrankheit des Weizens und ihren Erreger Cercosporella herpotrichoides Fron.** [On the straw-breaking disease of Wheat and its agent, *Cercosporella herpotrichoides* Fron.]—*Phytopath. Z.*, 17, 3, pp. 293–304, 6 figs., 1950. [Received April, 1952.]

The results of rotation experiments at the Kiel–Kitzeberg (Schleswig-Holstein) branch of the German Biological Institute confirmed repeated observations in practice concerning the inferiority of cereals (summer wheat, winter barley, and rye) to foliage plants (opium poppy and summer rape) as precursors of winter wheat (Carsten V) from the standpoint of infection by *Cercosporella herpotrichoides* [*R.A.M.*, 18, p. 586; 31, p. 170]. Lodging was the principal source of damage to the grain, especially when coupled with weather conditions unfavourable to ripening. The relative merits of different crops in the rotational sequence cannot be assessed on the basis of the absolute yields produced in fields selected at random, but a direct comparison must be made between plots subjected to identical conditions in respect of manuring, cultivation, and harvesting. A similar uniformity should be maintained in the plot experiments with *C. herpotrichoides* (which must be free from natural contamination), inoculation being the sole means of appraising the damage caused by the disease.

Du Plessis (S. J.) & Norjé (J. H.). **Susceptibility of Wheat and Rye varieties and of grass species to Ophiobolus graminis Sacc.**—*Sci. Bull. Dep. Agric. S. Afr.* 328, 19 pp., 5 figs., 1952.

In resistance breeding tests at Stellenbosch, South Africa, against *Ophiobolus graminis* all the 47 wheat varieties [*R.A.M.*, 30, p. 515] tested from 1946 to 1950, including even the descendants of Sterling plants which were originally resistant to severe attacks of the disease, proved so susceptible that all hope of breeding for resistance along these lines must be abandoned. The rye varieties [ibid., 30, p. 313] Abruzzi (40-9), Cape Rye, Stooling Rye, Balbo, and Nostrana Commune showed, however, a relatively high resistance and a marked capacity to recuperate from the disease. None of the 107 wheat–rye hybrids (Chinese wheat × Abruzzi) was resistant when subjected to infection for three successive years, the resistance factors in rye being apparently lost during hybridization. *Agropyron distichum* was even more susceptible than wheat and all the hybrids from crosses between *A. elongatum* and several wheat varieties were as susceptible as Sterling. Susceptibility was observed in all the 15 grass species [ibid., 12, p. 9] tested in take-all infested soil. These grasses are very common in wheat fields and ensure the survival of *O. graminis*, particularly on old land, fallows, and lucerne ley [cf. ibid., 31, p. 429]. Further studies are required on the suppression of grasses by cover crops and by effective grazing.

Ishii (H.) & Koyama (H.). **Conidial discharge and the secondary infection in the ear blight of cereals.**—*Agric. & Hort., Tokyo*, 27, pp. 397–398, 1952. [Japanese.]

No *Fusarium* conidia were trapped in the field on glass slides coated with glycerin-gelatin even when wheat ears affected by scab (*Gibberella saubinetii*) [*G.*

zeae: *R.A.M.*, 17, p. 666] were present, nor were they collected in bell jars from heavily infected ears hanging over the slides. The conidia are disseminated only by water drops, since the mucilaginous substance covering them prevents them from being easily detached by wind. Spraying with an organic sulphur compound [ibid., 17, p. 196], nockmate water emulsion No. 2 (0·5 per cent.), at early heading time gave the most effective control of head blight, the efficacy of the treatment decreasing with delay in application.

Fenne (S. B.) & Roane (C. W.). **Wheat mosaic in Virginia.**—*Plant Dis. Reptr*, 36, 5, p. 212, 1952. [Multilithed.]

A widespread outbreak of wheat mosaic virus [*R.A.M.*, 31, p. 323], reported in 1952 from the Piedmont and Tidewater areas of Virginia, is believed to be associated with the introduction in 1950 of the mosaic-susceptible Atlas 50 and Atlas 66 wheat varieties. The latter becomes severely stunted and mottled; Thorne and Vahart are also slightly affected. The mosaic-rosette or wheat virus 1 strain of wheat mosaic virus appears to be the causal agent.

Roane (C. W.) & Starling (T. M.). **Scald resistance in Oldambster Barley.**—*Plant Dis. Reptr*, 36, 5, pp. 212–213, 1952. [Multilithed.]

The Oldambster (C.I. 2491) barley variety was highly resistant to natural infections of scald (*Rhynchosporium secalis*) [*R.A.M.*, 31, p. 60] in 1951 at the barley breeding and disease nursery at Blacksburg, Virginia, other varieties in adjacent rows being severely diseased.

Stanton (T. R.). **Registration of varieties and strains of Oats, XVI.**—*Agron. J.*, 44, 3, pp. 144–153, 1952.

During 1950, 12 varieties of oats were approved for registration in the United States [cf. *R.A.M.*, 29, p. 255]. In the spring group the early yellow Andrew, Reg. No. 113 [ibid., 29, p. 151], is resistant to the common races of stem rust [*Puccinia graminis*] and the relatively new race 7, but susceptible to races 8 and 10 [ibid., 30, p. 314]; resistant to crown rust [*P. coronata*], except races 45, 47, and similar ones [ibid., 30, p. 606], the prevalent races of smuts [*Ustilago avenae* and *U. kolleri*], and Victoria blight (*Helminthosporium victoriae*).

The early white Cherokee, Reg. No. 114 [ibid., 29, p. 151], is resistant to the common races of *P. coronata*, reasonably tolerant in the field of race 45, and resistant to the common races of *P. graminis* (except 7), most smut races, and *H. victoriae*. The disease reactions of the early white Nemaha, Reg. No. 115 [loc. cit.], are similar to those of Cherokee.

The mid-season white Shelby, Reg. No. 118 [ibid., 29, p. 151], is highly resistant to *P. coronata*, except race 45, of which it appears to be somewhat tolerant, and resistant to *P. graminis* (except race 7). The mid-season white Zephyr, Reg. No. 119 [loc. cit.], is resistant to many races of *P. coronata*, *P. graminis*, *U. avenae*, and *U. kolleri*.

A note on Cody (Reg. No. 116) and Overland (Reg. No. 117) [ibid., 31, p. 180] and the winter group Mustang, Reg. No. 120 [ibid., 31, p. 113], Arlington, Atlantic, and Letoria, Reg. Nos. 122–124 [ibid., 29, p. 255], has already appeared.

Pichler (F.). **Eine Methode der Beizmittelprüfung gegen Schneeschimmel (Fusarium) im Laboratorium.** [A method of testing disinfectants against the snow mould (*Fusarium*) in the laboratory.]—*PflSchBer.*, 8, 1–2, pp. 3–10, 4 figs., 1952. [English summary.]

The following simple method adapted from Germ's (*Gartenztg, 1949*, 8–9, p. 3, 1949) [cf. *R.A.M.*, 29, p. 552] of testing fungicides for their efficiency in the control

of the snow mould (*Fusarium*) [*Calonectria nivalis*] on rye [ibid., 30, p. 33 and next abstract] has proved useful at the Plant Protection Institute, Vienna. A moist strip of hard, white filter paper is placed on a soft, grey one, and both are then laid on a dry strip of parchment paper. The two filter papers measure 57 by 15 and the parchment 67 by 15 cm. The naturally infected seeds are laid on the white strip 3 cm. from one side in a single row 1 cm. apart. The strips are then rolled up loosely together and placed in a glass cylinder, the end with the row of seeds being uppermost, covered with a glass plate and held in a refrigerator at 6° to 8° C. for six weeks, whereupon the length of each shoot is measured and the average of the treated and untreated (= 100) compared. Further criteria of the value of a given seed dressing are the development of mycelium, the condition of the leaves, and the discoloration of the white paper.

Pichler (F.). **Über die Prüfung von Roggensorten auf ihre Anfälligkeit für Schneeschimmel.** [On the testing of Rye varieties for their susceptibility to snow mould.]—*PflSchBer.*, 8, 3–4, pp. 33–43, 1 fig., 1952. [English summary.]

In some parts of Austria, referred to as infection areas, the snow mould (*Fusarium*) [*Calonectria nivalis*] infects only the seed of rye [see preceding and next abstracts], while in others, infestation areas, there is also visible infection of the seedlings. A prerequisite condition for the former is a protracted period of 100 per cent. atmospheric humidity, while lengthy duration of the snow cover (mostly over 100 days) is essential for the latter. Varieties to be tested for their reaction to snow mould should first be sown in an infection area. In the next year the seed produced may be used for laboratory, greenhouse, and field tests in the infestation area.

Ekstrand (H.). **Om höstsädens och fodergräsens övervintringssvampar. Utsädessmittan av Fusarium och dess betydelse för höstsädens övervintring.** [On the overwintering fungi of autumn cereals and fodder grasses. Seed infection by *Fusarium* and its importance for the overwintering of cereal seed.]—*Nord. JordbrForskn., 1951*, 2–3, pp. 522–528, 1951.

In this paper, read at the eighth congress of the Scandinavian Agricultural Research Workers' Association, held in Helsinki in June, 1950, the author recapitulates previous observations and presents further evidence to demonstrate the importance of *Fusarium* [*Calonectria nivalis*: see below, p. 556 and preceding abstracts] as a factor, in association with low temperatures, in the winter-killing of rye in Sweden [*R.A.M.*, 30, pp. 273, 364, *et passim*]. In connexion with the question of seed treatment [ibid., 28, p. 164] the wide variations existing between the laboratory and field performances of fungicides are emphasized as greatly complicating an appraisal of their practical efficiency.

Jenkins (Merle T.) & Robert (Alice L.). **Inheritance of resistance to the leaf blight of Corn caused by Helminthosporium turcicum.**—*Agron. J.*, 44, 3, pp. 136–140, 1 graph, 1952.

At the Plant Industry Station, Beltsville, Maryland, the inheritance of resistance to leaf blight (*Helminthosporium turcicum*) [*R.A.M.*, 29, p. 20; 31, p. 280, above, p. 542, and next abstract] was studied in seven crosses involving three susceptible and five resistant inbred lines of maize, the F_2 of these crosses, and the back-crosses to the resistant and susceptible parent lines. Seven of the 17 monoconidial strains used in the production of the mixed inoculum were collected in Georgia, two each in Kentucky, Maryland, and Pennsylvania, and one each in Indiana, Nebraska, Ohio, and Virginia.

The five resistant lines, T528, CI.23, Mo 21A [ibid., 27, p. 120], NC34, and L97, differed in their genetic reaction with the highly susceptible R4. The resistance of

NC34 and Mo 21A, which are each believed to carry a major gene for resistance, was most and that of T528 and CI.23 least dominant, while L97 was intermediate. The three susceptible lines, R4, 38–11, and K64, differed materially in reaction with NC34. R4 carries a major recessive gene contributing to extreme susceptibility, which was not present in 38–11 or K64, though there was some evidence that the latter carried a gene inducing a lesser degree of susceptibility.

The differential reactions of the five resistant lines with R4, those of the three susceptible with NC34, and the nature and location of the distributions obtained for the F_2 and the back-crosses denote that resistance to *H. turcicum* is controlled by a fairly large number of genes.

WERNHAM (C. C.). **Disease resistance and early testing of Maize.**—*Science*, 116, 3003, pp. 57–58, 1952.

The author discusses the problems associated with breeding and early yield testing of maize for resistance to diseases, with particular reference to *Helminthosporium turcicum* [see preceding abstract] in Pennsylvania [*R.A.M.*, 29, p. 292]. The principal difficulty is in dealing with the large numbers of progeny from experimental crosses. Testing earlier generations, when numbers are smaller, is objected to on the grounds that the material is non-uniform and a second top-cross is required. The author has found that hybrid progenies behave more uniformly if grown under normal (not disease) conditions for one season. Genetical arguments are presented to support the suggestion that an additional top-cross is unnecessary.

MAHMUD (K. A.). **Root rot of Maize caused by Pythium aphanidermatum.**—*Sci. & Cult.*, 17, p. 339, 1952.

In July, 1948, 90 per cent. of maize seedlings in a garden at Ramtek, India, developed a root disease due to *Pythium aphanidermatum* [cf. *R.A.M.*, 25, p. 542], not before recorded on maize in India. Pathogenicity tests, using autoclaved soil in pots, gave cent. per cent. positive results, the organism being in all cases reisolated from the affected seedlings.

BAZÁN DE SEGURA (CONSUELO). **Informe sobre un viaje a la zona de Bagua efectuado en Diciembre de 1951.** [Report on a tour to the region of Bagua made in December, 1951.]—*Bol. Estac. exp. agríc. Lima* 44, pp. 10–13, 1952. [Mimeoprinted.]

In this report it is stated that the lemon trees, wild and cultivated, inspected by the author in December, 1951, in the Bagua region, Amazonas, Brazil, were severely infected by a species of *Septoria*.

H[ARVEY] (C.). **Canker disease of Citrus.**—*Agric. J. Fiji*, 22, 1, pp. 30–31, 1951.

Citrus canker [*Xanthomonas citri*: C.M.I. map No. 11] has been discovered in Fiji in a destructive phase on grapefruit, orange, and wild lemon. Symptoms, factors favouring the disease, and control methods are given.

KRUG (C.). **Viagem de estudos à Colômbia, Costa Rica, Guatemala e México.** [Tour of investigation to Colombia, Costa Rica, Guatemala, and Mexico.]—*Bol. Supda Serv. Café, S. Paulo*, 27, 300, pp. 147–174, 1952.

This article, reprinted from *Folha da Manhã, S. Paulo*, of 30th January, 6th, 13th, 20th, and 26th February, and 5th March, 1952, contains a note (pp. 158–159) on three coffee diseases in Colombia, namely, the canker caused by *Ceratostomella* [*Ceratocystis*] *fimbriata* [*R.A.M.*, 30, p. 366; 31, p. 237]; a disorder, apparently of physiological origin, known as 'crinkle' and characterized by the development of

abnormally short internodes, very slow growth, and the production of small, generally crinkled leaves of unusually coarse texture and pale colour; and leaf spot (*Omphalia flavida*) [*Mycena citricolor*: ibid., 31, p. 374].

Steinhaus (E. A.). **Microbial infections in European Corn borer larvae held in the laboratory.**—*J. econ. Ent.*, 45, 1, pp. 48–51, 1952.

Of 274 larvae of the European corn borer (*Pyrausta nubilalis*) which died in United States Department of Agriculture laboratories in Ohio and Iowa, 77 (28 per cent.) were found on inspection at the Laboratory of Insect Pathology, College of Agriculture, University of California, Berkeley, to harbour only *Beauveria bassiana* [*R.A.M.*, 31, p. 116] or atypical forms resembling *B. globulifera* [ibid., 25, p. 262], 44 (16) *Beauveria* and microsporidia, 12 (4) *Beauveria* and bacteria, 5 (2) *Beauveria*, microsporidia, and bacteria, 7 (3) miscellaneous fungi, and 1 (0·4) bacteria and miscellaneous fungi.

Egle (K.). **Tierfangende Pilze–'Aussenseiter' des Pflanzenreichs.** [Predacious fungi–'outsiders' of the plant kingdom.]—*Umschau*, 52, 5, pp. 135–137, 5 figs., 1952.

This is a useful summary of the information available to date on the history, mode of propagation, parasitic mechanism, and ecology of the predacious fungi [cf. *R.A.M.*, 31, pp. 64, 283].

Culbertson (J. O.). **Registration of improved varieties of Flax, V.**—*Agron. J.*, 44, 3, pp. 153–154, 1952.

Two new flax varieties are described [cf. *R.A.M.*, 29, p. 212]. Sheyenne (Reg. No. 10) [ibid., 29, p. 213] is highly resistant to wilt (*Fusarium lini*), about as tolerant of pasmo (*Sphaerella linorum*) as Bison, and carries the Ottawa 770 B gene for rust reaction, conferring immunity from all the known North American races of *Melampsora lini* [ibid., 31, p. 489].

Redwood (Reg. No. 11), produced at the Minnesota Agricultural Station, carries the Tammes Pale Blue factor for resistance to rust [ibid., 26, p. 489] and, like its B5128 parent, is immune from all the known North American races. It is more resistant to wilt than either B5128 or Dakota, but not equal to Bison in this respect. Redwood is susceptible to *S. linorum*, though more tolerant than Renew, B[olley's] Golden, Viking, or Victory.

Schaefer (E. E.). **Diseases of Roses.**—*Fmg in S. Afr.*, 27, 311, pp. 57–58, 1952.

The four most important diseases of roses in South Africa are described. Powdery mildew (*Sphaerotheca pannosa*) [*R.A.M.*, 29, p. 89] and black spot [*Diplocarpon rosae*: loc. cit.], the two commonest, are best controlled by sulphur dust applications once a fortnight. Fungi causing stem canker [*Leptosphaeria coniothyrium*: C.M.I. map No. 185] or die-back [*Griphosphaeria corticola*: *R.A.M.*, 18, p. 597], though often present under conditions unfavourable for roses, are not very virulent. Bushes infected with crown-gall [*Bacterium tumefaciens*: ibid., 29, p. 89], if appropriately treated, may continue to grow normally and need not be destroyed.

Schmidt (Trude). **Epidemieartiges Auftreten von Oidium syringae in Österreich.** [Epidemic occurrence of *Oidium syringae* in Austria.]—*PflSchBer.*, 8, 1–2, p. 22, 1952.

Attention is drawn to an epiphytotic of mildew (*Oidium syringae*) on lilac [*R.A.M.*, 31, p. 239] in Vienna and its environs in the summer and autumn of 1951, this being the first record of the disease for Austria [cf. ibid., 26, p. 317].

Zentmyer (G. A.) & Munnecke (D. E.). **Phytophthora root rot of nursery stock.** —*Plant Dis. Reptr*, 36, 5, pp. 211–212, 1952. [Multilithed.]

In 1951 and 1952 *Phytophthora cinnamomi* [*R.A.M.*, 31, p. 339] was isolated from a number of young cuttings or seedlings in southern California, including *Cedrus deodara*, *Chamaecyparis lawsoniana* var. *elwoodi*, *Libocedrus decurrens*, *Cupressus sempervirens* [var.] *glauca*, *Thuja compacta*, and *Myrtus compacta*. Losses were particularly severe in *Camellia* [see above, p. 541] beds where several varieties, especially Covina, were affected. *P. cinnamomi* was isolated from soil beneath the nursery lathhouse beds to a depth of nine inches.

Jeffers (W. F.). **Downy mildew of Snapdragon found in Maryland.**—*Plant Dis. Reptr*, 36, 5, p. 211, 1 fig., 1952. [Multilithed.]

Peronospora antirrhini [C.M.I. map No. 222] is reported to have caused serious damage to snapdragons [*Antirrhinum majus*] in a commercial greenhouse in Maryland. Thorough application of zineb gave fairly good control.

Guba (E. F.). **Breeding Carnations for resistance to Fusarium wilt.**—Abs. in *Phytopathology*, 42, 2, pp. 112–113, 1952.

The reactions of numerous carnation varieties to *Fusarium dianthi* [*R.A.M.*, 30, p. 468] was determined by surveys, questionnaires, and inoculation tests at Waltham, Massachusetts. Among the new resistant varieties developed and tested [ibid., 31, p. 227] and introduced to the trade is Spicy Rose (Puritan × Eleanor). This and Waltham Pink, Regal Pink, and Mrs. E. F. Guba [loc. cit.] are also resistant to rust (*Uromyces caryophyllinus*) [*U. dianthi*] and blight (*Alternaria dianthi*) [ibid., 25, p. 344]. A number of other promising wilt-resistant seedlings are in process of appraisal and development.

Wolf (F. T.) & Wolf (F. A.). **Pathology of Camellia leaves infected by Exobasidium camelliae var. gracilis Shirai.**—*Phytopathology*, 42, 3, pp. 147–149, 1 fig., 1952.

For some years past *Camellia sasanqua* at Duke University, Durham, North Carolina, has been suffering from a disease caused by *Exobasidium camelliae* var. *gracilis* [cf. *R.A.M.*, 19, p. 413; 27, p. 126], which induces enlargement of all the leaves on new shoots and exfoliation of the lower epidermis and contiguous tissues. Histological examination revealed both hypertrophy and hyperplasia of the host cells, differentiation of the leaf mesophyll being inhibited. The inception of basidial development within the leaf leads to a sloughing-off of the epidermis and adjacent cells. The four curved, apically broadened basidiospores measure 11 to 14 by 2·5 to 5·5 μ.

Indoleacetic acid was produced by two-week-old cultures of the fungus on Czapek's agar, and it is thought that this substance may be partially responsible for the pathological changes in the leaves [cf. ibid., 22, p. 55].

Simmons (S. A.) & Shoemaker (R. A.). **Differential staining of fungus and host cells using a modification of Pianeze III B.**—*Stain Tech.*, 27, 2, p. 121, 1952.

A modification of Vaughan's technique for the mycological application of Pianeze III B reagent (*Ann. Mo. bot. Gdn*, 1, pp. 241–242, 1914) was successfully used at Ontario Agricultural College in studies on the invasion of *Gladiolus* corms by *Sclerotinia draytoni* [*R.A.M.*, 28, p. 399]. The mycelium stained bright pink and the host cells green. The following formula was used: malachite green 0·5 gm., acid fuchsin 0·1 gm., Martius yellow 0·01 gm., distilled water 150 ml., and 95 per cent. alcohol 50 ml. A minimum of 45 minutes was requisite in Pianeze III B and was followed by dehydration, clearing, and mounting in balsam.

Allmendinger (D. F.), Miller (V. L.), & Johnson (F.). **The control of fluorine scorch of Gladiolus with foliar dusts and sprays.**—*Proc. Amer. Soc. hort. Sci.*, 56, pp. 427–432, 1 fig., 1 graph, 1950.

The results of experiments in 1948 and 1949 at Washington State College with alkaline dusts and sprays for the control of *Gladiolus* scorch caused by atmospheric fluorine effluents [*R.A.M.*, 29, p. 466; 31, p. 135] showed that the disease was reduced in all treated plots. Six or eight sprays of lime (1 lb. Sierra–5 gals. water) or sugar-lime (8 lb. sugar–1 lb. lime–5 gals. water) plus wetter at intervals of one or two weeks gave particularly good control and were more effective than dusts. The lime absorbs considerable quantities of fluorine, which decreased noticeably in the plant tissue as the effectiveness of the sprays and dusts increased. The varieties used were Picardy, Ethel Cave Cole, and Snow Princess.

Baruah (H. K.) & Baruah (P.). **On the biology of Sclerotium delphinii Welch attacking garden Lilies.**—*Sci. & Cult.*, 17, 7, pp. 304–305, 1 fig., 1952.

Studies at the Department of Botany, Gauhati University, India, have revealed *Sclerotium delphinii* [*R.A.M.*, 14, p. 147] as responsible for rotting of the main stem at ground level and ultimate death of garden lilies in the summer of 1949. When mycelial inoculum was inserted in wounded stem and bulb tissues the symptoms of the disease appeared readily, while with sclerotial inocula they appeared two to three days later in wounded roots but readily in wounded bulbs. *S. delphinii* was found to be pathogenic when wound-inoculated to onion [loc. cit.], tomato [ibid., 18, p. 183], [unspecified] bean [cf. ibid., 17, p. 557], green and ripe mango, brinjal [eggplant], guava, carrot, pineapple, papaw [ibid., 13, p. 387], and cabbage [loc. cit.]. Potato and radish [loc. cit.] were not attacked by the fungus.

Roistacher (C. N.). **Phytotoxicity of formaldehyde residue on flats.**—*Phytopathology*, 42, 3, pp. 171–172, 1 fig., 1 graph, 1952.

Particulars are given of experiments at the University of California, Los Angeles, demonstrating the injury to seedlings, particularly *Petunia*, from volatilized formaldehyde from treated greenhouse flats kept in a dry atmosphere before planting after spraying with 5 per cent. formalin. Four or five days of watering twice daily before planting were necessary to minimize the damage, but two to three should suffice under normal greenhouse conditions.

Jain (A. C.) & Nema (K. G.). **Blossom blight of Dahlia.**—*Curr. Sci.*, 21, 3, pp. 71–72, 1952.

The first symptom of a blossom blight of *Dahlia* observed at Nagpur, India, during a period of high atmospheric humidity in August and September, 1950, was the formation on the corolla of minute, watersoaked spots, which rapidly enlarged and caused a soft rot and shedding of most of the petals. Brown to black discoloration of the tissues may advance to the bracts and flower stalk. Shortly afterwards the diseased tissues become covered with the fructifications of the pathogen. On the basis of its cultural and morphological characters the fungus is referred to *Choanephora infundibulifera*. A similar disease of *Dahlia* caused by an unidentified *C.* sp. has been reported from Florida [*R.A.M.*, 4, p. 722].

At 28° to 30° C. on rice agar the fungus grows rapidly, producing conidiophores with dark brown, elliptical or obovate, geniculate, finely spinulose conidia, 7·5 to 23·7 by 6·7 to 14·4 (average 15·1 by 10·7) μ. After the liberation of the conidia the globular or pyriform cells producing them collapse and are replaced by funnel-shaped structures, still attached to the primary capitate vesicle. The sporangia

measure 27 μ in diameter on the host and 30 to 60 by 30 to 48 (43·3 by 39·1) μ in culture; the globose, elliptical, or triangular, dark brown sporangiospores are 7·3 to 18·6 by 4·4 to 13·6 (13·8 by 9·3) μ; there is a large, round columella with the remnants of the wall. The dark brown to chocolate-coloured, nearly globular zygospores are 36·6 to 60·9 (50·1) μ in diameter.

The application of a spore suspension of the pathogen to fresh *Dahlia* flowers resulted in the development of typical symptoms within 24 hours, the controls remaining healthy; the pathogen was reisolated.

PRASAD (N.). **Fire blight of Cosmos—a bacterial disease incited by Erwinia cosmovora n.sp.**—*Curr. Sci.*, 21, 1, p. 17, 1952.

A discoloration and dry necrosis of the flowers, bracts, leaves, and shoots of *Cosmos bipinnatus*, observed at the Agricultural Institute, Anand, India, in August, 1951, was found to be due to a new species of *Erwinia*, for which the name of *E. cosmovora* is proposed. On agar the colonies of the organism, a single, motile, Gram-negative, non-sporing, non-capsulated rod, 1 to 1·5 by 0·8 to 1 μ, are greyish-white and glistening, with irregular margins; gelatin is partially liquefied, indole is not produced, nitrates are reduced to nitrites, acid without gas is evolved from glucose, maltose, and lactose, starch is hydrolysed, and no growth occurs in the absence of organic nitrogen.

ARX (J. A. v.). **Meeldauw op Cineraria en andere sierplanten.** [Mildew on Cineraria and other ornamental plants.]—*Tijdschr. PlZiekt.*, 58, 1, pp. 10–13, 2 figs., 1952. [German and English summaries.]

Cinerarias sustain heavy damage in Holland from a powdery mildew referred by Blumer to *Oidium cinerariae* [*R.A.M.*, 13, p. 127], the perfect state of which was hitherto unknown. The conidia measure 28 to 37 by 17 to 22 μ. In June, 1951, spherical, dark-coloured perithecia, 80 to 120 μ in diameter, were observed on old, severely infected leaves. The appendages, sometimes branched and often flexuous, were brown near the perithecium, merging into olive-brown to subhyaline at a distance, 4 to 8 μ in thickness and two to three times the average diameter of the perithecium. The single ascus was 70 to 95 by 60 to 80 μ and the ascospores 20 to 27 by 15 to 19 μ. The fungus is assigned to *Sphaerotheca fusca*, which occurs in nature on *Senecio nemorensis*, *S. fuchsii*, and *Doronicum grandiflorum*. Inoculation experiments with the cineraria mildew on *Begonia*, *Chrysanthemum*, *Kalanchoe*, *Cyclamen*, and *Primula* were unsuccessful, and isolates from these plants were innocuous to cineraria.

ARX (J. A. v.). **De voetziekte van Gerbera, veroorzaakt door Fusarium oxysporum Schlecht.** [The foot rot of *Gerbera* caused by *Fusarium oxysporum* Schlecht.]—*Tijdschr. PlZiekt.*, 58, 1, pp. 5–9, 1952. [German and English summaries.]

Gerbera jamesonii, highly prized as a glasshouse ornamental in Holland, suffers from a foot rot resulting in heavy mortality. The stem darkens to black and decays, while the foliage and flowers wither. Soil inoculation experiments with the three fungi predominating in isolations from the diseased plants, namely, *Fusarium oxysporum*, *Pythium debaryanum*, and *Gliocladium penicilloides*, gave positive results in the case of the first-named only [cf. *R.A.M.*, 29, p. 289]. *F. oxysporum* was reisolated from the infected plants. Control may be effected by steam sterilization (this method being primarily applicable to the seed-bed) or by the encirclement of the stem bases with a loose, porous, rapidly drying substance, such as coarse sand, fine gravel, or vermiculite. In the first year's test, plants protected in this way with a surface layer of 8 cm. gravel or 4 cm. vermiculite remained healthy, while the loss in control plots was 22 per cent.

JAMALAINEN (E. A.). **Förekomsten av övervintringssvampar på vallgräsen i Finland.** [The occurrence of overwintering fungi on pasture grasses in Finland.]—*Nord. JordbrForskn., 1951*, 1–2, pp. 529–534, 1951.

In this paper, presented at the eighth congress of the Scandinavian Research Workers' Association, held in Helsinki in June, 1950, the author describes a study carried out in the preceding spring in which the role of *Typhula* spp., including *T. itoana* and *T. borealis* [*R.A.M.*, 30, p. 364], and *Fusarium nivale* [*Calonectria nivalis*: see above, p. 550] in winter injury to pasture grasses in Finland was investigated at the Dickursby and Maaninka Experiment Stations. At the former the percentages of infection and mortality (*T.* spp. only) were calculated from counts of individual plants, while at the latter they were estimated by visual appraisal. At Dickursby two varieties of *Alopecurus pratensis* each contracted 25 per cent. infection, mortality being 4 and 7 per cent., respectively. At Maaninka infection percentages were 40 and 30, respectively, but no plants were killed. The percentages of *C. nivalis* and *T.* spp. on eight varieties of *Dactylis glomerata* at Dickursby ranged from 20 to 60 and 30 to 65, respectively, and mortality from 4 (Tammisto II) to 100 (New Zealand), the corresponding figures for Maaninka (omitting New Zealand) being 10 to 15, 80 to 100, and 5 (Tammisto II) to 40. Nine varieties of *Festuca pratensis* developed 10 to 55 per cent. infection by *C. nivalis* and 25 to 45 per cent. by *T.* spp. at Dickursby, the corresponding figures for eight varieties at Maaninka being 0 (P. 476 Jokioinen and Tammisto II) to 10 and 30 to 60. The percentage of winter-killing ranged from 2 to 16 at Dickursby; with none at Maaninka. At the former station all three varieties of *F. rubra* contracted 10 per cent. infection by *C. nivalis* and 10 to 35 per cent. by *T.* spp., the corresponding figures at the latter being 0 and 10 to 50, and mortality at the two localities 8 to 25 and 5 to 15, respectively. At Dickursby *C. nivalis* caused 100 per cent. and *T.* spp. 70 per cent. infection on three varieties of *Lolium multiflorum*, the corresponding figures at Maaninka being 100 and 10, while winter-killing at the two stations ranged from 63 to 99 and 95 to 100 per cent., respectively. At the former station the incidence of *C. nivalis* and *T.* spp. on five varieties of *L. perenne* ranged from 40 to 100 and 40 to 85, respectively, the corresponding figures at the latter being from 5 (Valinge) to 100 (Italian hybrid) and 30 to 60; mortality at Dickursby was between 10 and 99 and at Maaninka between 0 and 100 per cent. At both stations the highest percentage of *C. nivalis* on 14 varieties of *Phleum pratense* was 10, while that of *T.* spp. ranged from 5 to 25 at Dickursby and from 10 to 80 at Maaninka; the mortality scale at the former was from 3 to 14 and at the latter from 0 to 10 per cent. *Poa pratensis*, *P. serotina*, and *P. trivialis* (one variety each) developed 5, 10, and 10 per cent. infection by *C. nivalis* and 45, 30, and 35 per cent. by *T.* spp. at Dickursby, the corresponding figures for Maaninka being 0, 5, and 10 and 10, 10, and 10 per cent., respectively, and for winter-killing at the two stations 35, 31, and 63 and 0, 0, and 20, respectively.

Since 1946 damage by *Sclerotinia borealis* [ibid., 30, p. 44] has decreased. In 1949 it was observed solely at the Apukka Experiment Station near Rovaniemi, and in the spring of 1950 only one specimen was received from the same locality.

CARTER (J. F.) & DICKSON (J. G.). **The influence of environment on the development of two foliar diseases of Bromus inermis Leyss.**—*Agron. J.*, 44, 3, pp. 119–125, 1 fig., 1 graph, 1952.

Further field trials at the Wisconsin Agricultural Experiment Station were conducted to determine the effect of plant spacing, nitrogen fertilizing, and heritable differences on the development of bacterial blight (*Pseudomonas coronafaciens* var. *atropurpurea*) and brown leaf spot (*Pyrenophora bromi*) on 40 clonal lines of smooth brome grass (*Bromus inermis*) [*R.A.M.*, 31, p. 65]. The

resistant lines contracted a considerably lower incidence of infection than the susceptible, but disease development was not appreciably influenced by plant spacing or nitrogen fertilizing.

Four resistant and four susceptible clonal lines were inoculated with the two pathogens in the greenhouse at 16°, 20°, 24°, and 28° C. The resistant lines were attacked fairly mildly and the susceptible ones severely by bacterial blight at all temperatures, the damage increasing in the higher ranges; at 24° and 28° the shoots of susceptible clones were blighted and the plants frequently killed. Injury from brown leaf spot also generally increased with rising temperatures, though the most susceptible line, S–1, was severely damaged in all the experiments. At high temperatures the expression of resistance in the resistant lines was somewhat diminished. In both diseases the size of the lesions increased as the temperature rose, coalescence being common at 24° and 28°. Lesions approximating most nearly to those occurring in the field developed at 24°.

MYERS (W. M.). **Registration of varieties and strains of Bluegrass (Poa spp.).**—*Agron. J.*, 44, 3, p. 155, 1952.

The information herein presented on the resistance of Merion Kentucky bluegrass (*Poa* [*pratensis*]) to leaf spot (*Helminthosporium* [*vagans*: *R.A.M.*, 31, p. 331]) has already been noticed from another source [ibid., 31, p. 285].

WILLARD (C. J.), THATCHER (L. E.), & JEFFERS (R. L.). **Kenland Red Clover—new disease-resistant variety adapted to southern Ohio.**—*Fm Home Res.*, 36, 273, pp. 84–85, 1951. [Received March, 1952.]

Notes are given on the new Kenland red clover resistant to southern anthracnose [*Colletotrichum trifolii*] and related diseases [*R.A.M.*, 31, p. 125]. At Columbus in an area affected by the disease, Kenland has outyielded all local strains every year since 1945.

HADIWIDJAJA (T.). **De krul- of heksembezemziekte van Crotalaria.** [The curl or witches' broom disease of *Crotalaria*.]—*Tijdschr. PlZiekt.*, 58, 1, pp. 1–4, 3 figs., 1952. [English summary.]

The author reviews the history of studies on the curl virus disease or witches' broom of *Crotalaria* which appears to be identical with mosaic [cf. *R.A.M.*, 29, p. 568]. Hitherto the economic losses caused by witches' broom on *Crotalaria usaramoensis*, *C. striata*, *C. juncea*, and *C. anagyroides* at Bogor, Java [ibid., 30, p. 261], have been inconsiderable and did not necessitate control measures. It is, however, advisable periodically to remove and destroy diseased plants in order to prevent further spread. Cross-inoculations by grafting indicated that the same virus or virus complex is concerned in the etiology of the disease in each of the four *C.* spp. mentioned above.

PRASAD (N.) & DESAI (M. V.). **Fusarium blight of Cluster Beans.**—*Curr. Sci.*, 21, 1, pp. 17–18, 1952.

Cyamopsis psoraloides [*C. tetragonoloba*] at the Agricultural Institute, Anand, India, sustained heavy damage during the exceptionally wet season of 1950 from a disease characterized at the outset by the appearance of thin, black streaks extending upwards and downwards on the stem. The leaf stalks also became involved and the affected shoots gradually withered without producing flowers or pods. Most of the isolates from the outer parenchymatous tissues, which invariably harboured mycelium, were species of *Fusarium* [cf. *R.A.M.*, 28, p. 295; 31, p. 386]. The one regarded as responsible for the disease was identified as *F. moniliforme* [*Gibberella fujikuroi*], inoculation tests with spore suspensions of which

resulted in the development of symptoms after three weeks; the pathogen was reisolated.

Gouny (P.) & Mazoyer (Rose). **Relations entre l'alimentation potassique et la chlorose calcaire de Lupinus albus L.** [Relations between potassium nutrition and calcareous chlorosis of *Lupinus albus* L.]—*C.R. Acad. Sci., Paris*, 234, 2, pp. 239–240, 1952.

When white lupins were grown in pots in nutrient solutions containing small amounts (1 to 2·5 per cent.) of calcium carbonate, the symptoms of lime-induced chlorosis [*R.A.M.*, 28, p. 525] varied according to the quantity of potassium supplied within a range of 3 to 39 mg., becoming milder as the supply increased. On the other hand, where calcium carbonate was present in larger amounts (5 to 20 per cent.), moderate supplements of potassium (12 and 19 mg. per l.) provided optimum conditions for the health of the plants, but the maximum dosage of 39 mg. intensified the chlorosis.

In practice, the application of potassium salts to soils with a low lime content tends to benefit the lupin crop by facilitating the absorption of iron, but the contrary effect will be experienced where lime is present in abundance.

Posnette (A. F.) & Harris (R. V.). **Virus diseases of fruit crops.**—*Nature, Lond.*, 170, 4318, pp. 181–182, 1952.

This is a review of the present position of virus diseases of strawberries and tree fruits in England and the trends of future research; some of the information has already been noticed from other sources [*R.A.M.*, 29, p. 199; 30, p. 523; 31, p. 171]. Three recently observed diseases on strawberries in nurseries are being studied. Green petal disease [ibid., 31, p. 440], prevalent on the Auchincruive Climax variety and associated with a leaf chlorosis, is believed to be of virus origin. In leaf chlorosis [ibid., 28, p. 442], which resembles the 'June yellows' disease in North America [ibid., 27, p. 430], two distinct symptom categories can be recognized: transient chlorosis of the young leaves in the spring, and chimaeral streaking and speckling persisting throughout the season; chlorosis is commonly associated with a reduction of vigour and is found also in varieties other than Climax. The cause of 'sudden yellows' on Royal Sovereign, though not of virus origin, is still obscure. Its symptoms are easily confused with those of severe yellow edge [ibid., 31, p. 440]. At East Malling Research Station heat therapy of runners of certain varieties, infected with group 1 viruses [ibid., 31, p. 171] and of which no completely virus-free clones have hitherto been obtainable, has resulted in the production of plants which did not transmit detectable symptoms to *Fragaria vesca* indicators. Vein-banding [ibid., 30, p. 46] and leaf flecking of pear appear to have a stunting effect on quince seedling indicators. Tatter leaf [ibid., 31, p. 171], rosette [loc. cit.], and rusty mottle [loc. cit.] in cherry scions have reduced the vigour of clonal rootstock F 12/1 [loc. cit.] by about 20 per cent. (girth and height) in two years, but rasp leaf [loc. cit.] has had more severe effects on most commercial varieties and not on F 12/1. Some cherry root stocks of mazzard selections were found to be infected with ringspot [ibid., 30, p. 46] but F 12/1, the most important selection, usually showing symptoms when infected so that beds can be rogued at sight, was free from the disease. Plum root stocks, on the other hand, are mainly symptomless carriers of a virus widely distributed in common plum and Marianna [cf. above, p. 537] and less so in the Myrobalan B and Brompton stocks. The common vein-banding or line-pattern leaf symptoms [loc. cit.] in plum scion varieties are thought to be caused by several viruses, while leaf roll and bark splitting, recently discovered symptoms on plums, are potentially serious on certain varieties, particularly greengages. Some stools of apple root stocks M I and M IX proved to be symptomless carriers of rubbery wood virus [ibid., 30, p. 167].

Ramsfjell (T.) & Gjærum (H. B.). **Forsøk med rådgjerder mot sjukdommer i frukt-og baerhagen 1949.** [Experiments in the control of fruit and small fruit diseases in 1949.]—*Meld. plpat. Inst., Oslo*, 4, 32 pp., 7 figs., 1950. [English summary. Received August, 1952.]

In 1949 the duration of the natural period of infection by apple rust (*Gymnosporangium tremelloides*) in Norway [*R.A.M.*, 31, p. 244] coincided with the blossom in the latter part of May. The disease is economically important only in a few localities, such as the inner regions of the western fjords and some upland areas in the interior. Of 30 varieties observed for their reactions to the disease, Silke and Flask were immune and a number of others highly resistant, including Alexander, Kaupanger, Prinsar, and Säfstaholm. Spraying with fermate materially reduced infection.

Several fungicides were tested for the control of apple scab (*Venturia inaequalis*) [ibid., 24, p. 453]. The disease was favoured by the damp, mild weather prevailing at the time of ascospore discharge, and spraying operations were frequently hindered by rain. Phygon [ibid., 31, p. 496] was outstanding in its toxicity to the pathogen, but its tendency to damage the fruit cannot be disregarded. Lime-sulphur and pomasol [see above, p. 534] gave good results in most of the trials, but none of the pure sulphurs exerted any appreciable effect.

A dormant application of 0·5 per cent. monocalcium arsenite effectively combated blossom blight (*Sclerotinia laxa*) [ibid., 17, p. 468; 28, p. 222] on the Säfstaholm and Signe Tillisch apple varieties.

The treatment of canker (*Nectria galligena*) with kankerdood [ibid., 30, p. 112] produced excellent results on the Gravenstein, Åkerø, and other apple varieties.

Alkaline Burgundy mixture (1·5 per cent. copper sulphate and 4·25 per cent. sodium carbonate) proved superior to lime-sulphur and micronized sulphur in the control of American gooseberry mildew (*Sphaerotheca mors-uvae*) [ibid., 24, p. 456], three applications giving considerably better results than one. The Whitesmith variety seems to be more tolerant of chemical treatment than the other varieties tested.

Drepanopeziza [*Pseudopeziza*] *ribis* [C.M.I. map No. 187] on black currants yielded to two applications, one just before and the other immediately after flowering, of kupro-klor (copper oxychloride) or copper Sandoz (copper oxide), both at 0·5 per cent.

Magnesium deficiency symptoms are prevalent, especially in nurseries, on apple, pear, plum, and cherry. Four sprays of 2 per cent. magnesium sulphate gave complete control in a nursery test [cf. *R.A.M.*, 29, pp. 31, 625]. The Säfstaholm and Foss apple varieties are particularly sensitive to magnesium deficiency. Apples also suffer from manganese deficiency [ibid., 30, p. 166]. Raspberry yellows, due to the same cause [loc. cit.], has been controlled by soil amendments or three foliar sprays (0·2 per cent.) of manganese sulphate.

The various commercial plant-protectives used in these experiments are listed in alphabetical order, with brief notes on their composition, properties, and fungicidal value.

Weber (Anna). **Svampesygdomme på Æbler under opbevaring.** [Fungal diseases of Apples in storage.]—10 pp., 1 col. pl., Statens plantepatologiske Forsøg, Lyngby, Denmark, 1952.

Useful information is presented in popular terms on the symptomatology, etiology, importance, life-histories of the causal organisms, and prevention of the following diseases affecting stored apples in Denmark: scab (*Venturia inaequalis*) [*R.A.M.*, 15, p. 588 *et passim*]; brown rot (*Sclerotinia fructigena*) [ibid., 25, p. 36]; soft rot or blue mould (*Penicillium* spp., including *P. expansum* [ibid., 31, p. 66]):

sooty blotch (*Gloeodes pomigena*) [ibid., 25, p. 203]; pink rot (*Trichothecium roseum*) [ibid., 27, p. 411]; bitter rot, caused mostly by *Gloeosporium album* [ibid., 31, p. 66] but sometimes by *G.* [*Neofabraea*] *perennans* [cf. ibid., 30, p. 307] and *G. fructigenum* [*Glomerella cingulata*: cf. ibid., 17, p. 13; 31, p. 244]; and grey mould (*Botrytis cinerea*) [ibid., 31, p. 66]. The leaflet is accompanied by an excellent coloured plate.

Stoll (K.). **Über die Symptome und Bekämpfungsmöglichkeiten von Viruskrankheiten an Kirschbäumen.** [On the symptoms and possibilities of control of Cherry tree virus diseases.]—*Schweiz. Z. Obst- u. Weinb.*, 61, 4, pp. 63–67, 2 figs., 1952.

A census taken in 1951 disclosed an unexpectedly high incidence of virus infections on cherry trees in the canton of Basel, Switzerland [*R.A.M.*, 31, p. 498], exceeding 20 per cent. in individual communities and 90 per cent. on certain agricultural holdings. Evidence was forthcoming in a few instances of the conveyance of infection from Basel to other parts of the country. The first step towards control is the eradication of diseased trees, and where only a few trees are involved this may be undertaken immediately. Heavily infected areas should be divided into two zones, A and B, the former comprising relatively few and the latter many diseased trees. In zone A all infected trees should be felled at once, and in B all young diseased trees and those past the age of profitable bearing, whereas trees which are still productive may be spared for a few more years unless they are near healthy ones.

Many trees in the infected areas carry virus without external symptoms, since the incubation period may be as long as two years and mild weather in the spring tends to modify their expression. Moreover, scions are often cut during dormancy, when the signs of incipient infection are scarcely recognizable. It is advisable, therefore, to procure grafting material from the cantonal horticultural agencies.

The transmission of infection by means of implements has not been demonstrated, but in an infected area they should nevertheless be sterilized in a 2 per cent. formalin solution after each time of use.

New cherry plantings should not be established on sites on which cherries have already been grown, and the young trees should be set at a distance of at least 100, preferably 200 m., from an infested location.

Mulder (D.). **Een hypothese over de oorzaak van het verschil tussen primaire en secundaire symptomen bij de Eckelraderziekte van zoete Kersen.** [A hypothesis as to the cause of the difference between primary and secondary symptoms in the Eckelrade disease of sweet Cherries.]—*Tijdschr. PlZiekt.*, 58, 1, pp. 21–24, 1952. [English summary.]

The conspicuous difference between the primary and secondary symptoms of the 'Eckelrade disease' of sweet cherries in Holland, the former consisting of yellow lesions of variable size on the foliage and the latter [already described: *R.A.M.*, 31, p. 128], is discussed in relation to the nature of virus infection in herbaceous and woody plants. The theory is advanced that the development of secondary symptoms in fruit trees depends on whether the virus reaches the growing point without causing necrosis of the meristematic tissue. Necrosis of the growing point is believed to impede or prevent the appearance of secondary symptoms.

Starr (M. P.), Cardona (C.), & Folsom (D.). **Bacterial fire blight of Raspberry.**—Abs. in *Phytopathology*, 42, 2, p. 114, 1952.

In addition to information already presented on bacterial fireblight of raspberry (*Erwinia amylovora* f.sp. *rubi*) in Maine [*R.A.M.*, 31, p. 130], it is stated that the

purple discoloration of the leaves, flower buds, and stems resulting from natural field infection and greenhouse inoculation finally culminates in invasion of the diseased tissues by *Fusarium*, *Botrytis*, *Alternaria*, and *Cladosporium* spp. Field infection appears to have been much reduced in 1951 by timely excision of all young, purple shoots.

KOELLREUTER (J.). **Morphologie und Biologie von Rhabdospora ramealis (Desm. et Rob.) Sacc.** [Morphology and biology of *Rhabdospora ramealis* (Desm. & Rob.) Sacc.]—*Phytopath. Z.*, 17, 2, pp. 129–160, 9 figs., 6 graphs, 1950. [Received April, 1952.]

Summarizing the history and discussing the systematic position of *Rhabdospora ramealis*, a facultative parasite of blackberries [*R.A.M.*, 8, p. 288] in Switzerland, the author relegates to synonymy a number of other names applied to the fungus, including *Cytosporina rubi* Died. (= *Hemidothis rubi* (Died.) Höhn.), *C. ramealis* (Desm. & Rob.) Petrak (= *Septocyta ramealis* (Rob.) Petrak), and *R. ramealis* var. *macrospora* [ibid., 13, p. 288].

The pathogen is widely distributed throughout the country on the principal cultivated variety, Theodor Reimers (*Rubus procerus*), and was observed in two localities on *R. laciniatus*; it also occurs on wild blackberries. The first symptoms appear in the summer, mostly on the basal portions of the shoots due to bear the following year, in the form of intensely dark green spots, the size of a pin's head, reddening after a few weeks and expanding to a diameter of about 2 cm. Later the centres turn brown, the margin remaining red. During the winter the pathogen is inactive, but at the end of February and beginning of March infection recommences, progressing rapidly upwards to a distance of 2·5 to 3 m. from the rootstock. The attack culminates in metabolic disturbances, the leaves and flower or fruit rudiments becoming discoloured and sooner or later fading and shrivelling.

The hyphae spread inter- and intracellularly through the host, especially in the collenchyma and parenchyma, giving rise to pycnidia from which bi- to quadricellular conidia are extruded in clearly discernible, whitish cirrhi, up to 1 mm. in length. The optimum temperature for conidial germination is about 21° C., with a minimum and maximum of 0° and 33°, respectively. The germ-tubes emitted by conidia on the shoots tend to grow in the direction of the stomata and penetrate them. The perfect state of the fungus has not been observed.

In inoculation experiments two isolates from Theodor Reimers and one from a wild blackberry were of comparable pathogenicity. Positive results were obtained only on the hosts already mentioned. On agar media at a temperature range of 15° to 27° the fungus showed a strong tendency to the formation of morphologically distinct sectors corresponding to *R. ramealis* var. *macrospora* [loc. cit.], but the subdivision of the species into morphological races or varieties appears to be contra-indicated by its extreme lability.

Very promising results in the control of *R. ramealis*, which may cause crop reductions of over 80 per cent., were secured by two applications (on 30th April and 18th June) of copper-containing sprays, the most effective being 1·5 per cent. Bordeaux mixture with or without 1 per cent. thiovit [ibid., 31, p. 49] or 0·1 per cent. sandovit [ibid., 30, p. 280].

WILHELM (S.). **Verticillium wilt and black root rot of Strawberry.**—*Calif. Agric.*, 6, 1, pp. 8–9, 14, 6 figs., 1952.

According to fumigation tests in 32-gal. cans of soil, a field dosage of 30 gals. per acre of CBP–55 [*R.A.M.*, 31, p. 44] would probably reduce the amount of infection by *Verticillium albo-atrum* [ibid., 30, pp. 121, 422] in strawberry plants and at 45 to 60 gals. would eradicate it almost completely. In the 1949–50 tests on a light loam soil near Watsonville excellent control of black root rot [ibid., 30, p. 573] was

obtained with two 15 gals. per acre treatments of CBP–55 applied by machine in the autumn, and incidence of *V. albo-atrum* wilt was reduced from over 65 to 5 per cent. No appreciable increase of wilt occurred in the fumigated plot in the second year. Major fungus pathogens, with the exception of *Cylindrocarpon* sp., were all absent from plant roots in the fumigated soil. In more extensive tests in 1951, made mostly with the Lassen strawberry variety, there was 75 to 80 per cent. *V. albo-atrum* wilt and extensive root deterioration from black root rot on untreated plots, but only 14·5 to 19·6 per cent. wilt on plots treated with split applications of CBP–55 at 30 gals. per acre. A single application did not give satisfactory commercial control, whereas the split application resulted in 5 per cent. wilt in smaller tests made with the Shasta variety and 3·1 and 4·4 per cent. in a commercially treated plot of an unnamed, moderately resistant variety. Applications of 40 to 80 gals. per acre of D-D [ibid., 31, p. 207] also reduced wilt incidence and gave considerable control of black root rot. Among the varieties grown in California, Sierra appears to be highly resistant to *V. albo-atrum*.

Of the fungi isolated from black root rot plants, probably the most significant are *Pyrenochaeta* (*Phoma*) *terrestris*, *Phoma* (?)*radicis* [cf. ibid., 27, p. 572], *Rhizoctonia* [*Corticium*] *solani* [ibid., 30, p. 573], *Pythium ultimum* [cf. ibid., 28, p. 21], *Stemphylium* (?)*radicinum* [cf. ibid., 26, p. 400], *Fusarium oxysporum* [cf. ibid., 27, p. 572], *F. solani* [ibid., 17, p. 259], *Cylindrocarpon* sp. [ibid., 16, p. 822; 28, p. 21], and *Rhizophagus*.

Cardeñosa Barriga (R.). **Investigaciones sobre la 'rayadilla' del Platano (Musa sp.) en Colombia.** [Studies on 'rayadilla' of Plantain (*Musa* sp.) in Colombia.] —*Acta agron., Palmira*, 2, 1, pp. 1–21, 6 figs., 1952.

The author reviews the history and symptoms of and researches on an obscure disease termed 'rayadilla' which first appeared on plantains in the Cauca Valley, Colombia, in 1939 and 1940, and is very similar to infectious chlorosis [*R.A.M.*, 28, p. 227]. Experiments up to the present have largely eliminated the possibility of a soil deficiency or virus infection, and indicated that nematodes [cf. ibid., 29, p. 629] were involved. Affected rhizomes did not give rise to affected plants.

Specifications and methods of analysis for certain insecticides, fungicides, and herbicides.—*Tech. Bull. Minist. Agric. Lond.* 1, vi+69 pp., 1 fig., 1951. 2*s.* 6*d.*

This publication, compiled by Dr. J. T. Martin, is the second edition of one originally published in 1949 which replaced bulletins 82 [*R.A.M.*, 13, p. 713] and 122 (on tar oil winter washes). Specifications and methods of analysis are given for the materials commonly used as fungicides, insecticides, and herbicides.

Recommended common names for pest control products.—16 pp., British Standard 1831 (Part 1), London, British Standards Institution, 1952. 2*s.* 6*d.*

A tabulated list of 23 short, coined names is given for well-established pest control products having long, cumbersome chemical names. It is recommended that these names, which refer only to the pure chemicals or essential ingredients and not to commercial products, should be adopted for common use. The products to which they refer are grouped under the headings insecticides (including insect repellents, acaricides, and nematocides), fungicides, and herbicides. The list correlates the recommended common name with the full chemical name and formula, both names being indexed for convenient reference.

Reichert (I.) & Palti (J.). **Synopsis of the results obtained with sulphur and copper fungicides in plant disease control in Palestine.**—Reprinted from the Proceedings of the 2nd International Congress of Crop Protection, 10 pp., [? 1951].

The results of trials carried out by the Agricultural Research Station, Rehovot,

in different parts of Israel, for the control of crop diseases by copper and sulphur fungicides, much of which has appeared in this *Review*, are briefly summarized. Lime-sulphur spray (1·5 per cent.) and sulphur dust gave satisfactory control of powdery mildew (*Oidiopsis* [*Leveillula*] *taurica*) on eggplant [*R.A.M.*, 31, p. 361] and chilli [loc. cit.], while the former spray also gave excellent control of garlic rust (*Puccinia porri*) [ibid., 29, p. 56], when applied at about ten-day intervals, and of mango powdery mildew (*Oidium mangiferae*) [ibid., 29, p. 250] on the leaves, flowers, and flower stocks. It also proved more effective than sulphur-dusting against rose powdery mildew (*Sphaerotheca pannosa*) [ibid., 15, p. 683] and gave a good control of antirrhinum rust (*Puccinia antirrhini*) [ibid., 30, p. 369], even where spraying was delayed until symptoms had appeared on the leaves. Perenox (0·33 per cent.) was equally effective against *S. pannosa* and *P. antirrhini*, and when repeated once in 12 to 16 days it adequately controlled *Macrosporium carotae* [*Alternaria dauci*: ibid., 23, p. 253] which, owing to its rapid development on carrots, cannot easily be detected in the early stages. Three fortnightly applications of 1 per cent. dispersible sulphur (spersul) spray or sulphur dust controlled *Oidium* sp. [ibid., 15, p. 478] on mangold. Leaf spot disease of groundnuts (*Cercospora personata*) [C.M.I. map No. 152; *R.A.M.*, 26, p. 181] was best controlled by five applications of sulphur dust (5 kg. per dunam [1 dunam = 0·22 of an acre]) at fortnightly intervals. Brown rot and gummosis of grapefruit and Jaffa oranges, caused by *Phytophthora citrophthora* [ibid., 29, p. 616], *P. parasitica* [ibid., 16, p. 451], and *P. hibernalis* [ibid., 28, p. 122], have been effectively reduced in three years' experiments by spraying the lower branches and leaves early in the rainy period with 0·5 to 1 per cent. Bordeaux mixture or 0·33 to 0·5 per cent. perenox. On grapefruit trees it was reduced to less than half by 1·5 per cent. Bordeaux mixture or 0·5 per cent. perenox. Spraying with 0·33 per cent. perenox (0·177 per cent. copper) or 1·5 per cent. cupro-ammoniacal floridan (0·127 per cent. copper) effectively controls *Diplodia natalensis* [ibid., 29, p. 617] only if applied after thorough pruning.

Keil (H. L.), Horsfall (J. G.), & Rich (S.). **Relation of laboratory ED 50 to field performance of fungicides.**—Abs. in *Phytopathology*, 42, 2, p. 113, 1952.

During the past three years a number of fungitoxic compounds have been tested in the field [? at the Connecticut Agricultural Experiment Station] as protectants against apple scab [*Venturia inaequalis*: cf. next abstract], bean [*Phaseolus vulgaris*] anthracnose [*Colletotrichum lindemuthianum*: *R.A.M.*, 31, p. 365], and other diseases. All the preparations were selected on account of their high resistance to washing off by rain, i.e., they gave wash-off curves with flat slopes (abs. in *Phytopathology*, 40, pp. 4–5, 1950). In general, their field performance was directly correlated with their ED 50 values obtained from dosage-response data in tests with the spores of *Stemphylium sarciniforme* and *Sclerotinia fructicola* [*R.A.M.*, 31, p. 339], the former being more useful in the assay of protectants against *V. inaequalis* and the latter for *C. lindemuthianum*. It is emphasized, however, that there is considerable variability in the relation of laboratory evaluations to field performances.

Rich (S.). **Using half-tree plots for increasing efficiency of fungicide tests.**—Abs. in *Phytopathology*, 42, 2, p. 114, 1952.

Proceeding on the assumption that two halves of the same biological unit tend to be much more uniform in their response to fungicidal treatments than two separate individuals, this approach has been tested during the past two years in comparative field trials [? at the Connecticut Agricultural Experiment Station] by the use of half-tree plots of 28 McIntosh apple trees. When different treatments

were applied to the east and west halves of each tree an analysis of variance segregated the block error and revealed no significant east-west effect. When the treatment was poor disease incidence [unspecified] was shown to be directly influenced by the amount of infection in the opposite half of the tree. There was no perceptible cross-tree contamination by spray drift.

Sellke (K.). **Die Ergebnisse der Prüfung von Pflanzenschutzmitteln im Jahre 1951.** [The results of the testing of plant protectives in the year 1951.]—*Dtsch. Landw.*, N.F., 3, 1, pp. 47–52, 1952.

This report from the Biological Institute, Berlin, on the results of tests on plant protectives in 1951 is concerned mainly with insecticides, but mention is made, *inter alia*, of the official recognition of fuclasin F for use in apple scab [*Venturia inaequalis*] control [see above, p. 534].

Görnitz (K.) & Harnack (W.). **Zur Frage der fungiziden Wirkung von Benetzungsmitteln.** [On the question of the fungicidal action of wetters.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., 5, 11, pp. 206–208, 1 fig., 1951.

H. Köhler's claims for the fungicidal action of debena [*R.A.M.*, 31, p. 444] are regarded as unacceptable. Like all wetters, including the potassium and sodium salts of a number of fatty acids and various commercial preparations, which the authors have been testing against vine downy mildew (*Plasmopara viticola*) since 1937, the compound doubtless induces mycolysis of pathogenic fungi, but the authors attribute this to an alteration in the physical constitution of the medium which acts indirectly on the fungus. They consider the chemical to be without significance in relation to plant disease control.

Czech (M.). **Über die Höhe der Geld- und Arbeitsaufwendungen für Pflanzenschutzmaßnahmen in landwirtschaftlichen Betrieben mit verstärktem Feldgemüsebau.** [On the extent of the outlay in money and labour on plant protection measures in agricultural concerns with intensive field vegetable cultivation.]—*Z. PflKrankh.*, 58, 9–10, pp. 332–345, 1951.

An inquiry was conducted in 1947–8, under the auspices of the Plant Protection Institute of the Stuttgart–Hohenheim Agricultural College, into the frequent allegations in German technical journals regarding the excessive cost in money and labour of plant protection measures. The investigations covered 12 farms run on up-to-date lines, seven very small to small (2·87 to 11·15 ha.) and five fair-sized to large (63·5 to 139·85 ha.). Attention was directed primarily to the spraying and dusting of field vegetables, which occupied 10 per cent. of the total area. Besides several insect pests, the following diseases were included in the investigations: cabbage 'black leg' (*Pythium debaryanum* and *Olpidium brassicae*) and downy mildew (*Peronospora brassicae*) [*P. parasitica*: *R.A.M.*, 28, p. 554]; mildew (*Erysiphe cichoracearum*), scab (*Cladosporium cucumerinum*) and angular leaf spot (*Pseudomonas lacrymans*) of cucumber [ibid., 29, p. 346]; *Alternaria* leaf spot (*A. solani*) [ibid., 25, p. 478], nailhead spot (*Macrosporium* [*A.*] *tomato* [ibid., 18, p. 766; 21, p. 53]), blight (*Phytophthora infestans*) [C.M.I. map No. 109] and stem rot (*Didymella lycopersici*) [*R.A.M.*, 19, p. 441] of tomato; and celery leaf spot (*Septoria apii*) [ibid., 31, p. 502].

A detailed analysis of the statistical data collected reveals a heavy outlay for protective treatment in both money and time. However, in relation to its efficiency and to the running expenses as a whole, the sums incurred for this purpose cannot be regarded as exorbitant, the cost in seven farms for the two years averaging 0·40 (for agriculture), 3·22 (for field vegetable crops), and 0·87 (for fruit culture) per cent. of the total employment of men's labour, and 0·29, 3·08, and 23·01 per cent., respectively, of animal labour.

Blumer (S.) & Kundert (J.). **Methoden der biologischen Laborprüfung von Kupferpräparaten.** [Methods for the biological laboratory assay of copper preparations.]—*Phytopath. Z.*, 17, 2, pp. 161–199, 4 figs., 1 diag., 8 graphs, 1950. [English summary. Received April, 1952.]

The results of the authors' studies at the Federal Research Institute for Fruit-growing, Viticulture, and Horticulture, Wädenswil, Zürich, on laboratory methods for the toxicometric determination of copper-containing fungicides have already been noticed, in a slightly abridged form, from another source [*R.A.M.*, 29, p. 419].

Gassner (G.). **Die chemotherapeutische Bewertung von Quecksilberverbindungen in den verschiedenen Beizverfahren.** [The chemotherapeutic evaluation of mercury compounds in the different methods of disinfection.]—*Phytopath. Z.*, 17, 1, pp. 1–35, 2 graphs, 1950. [Received April, 1952.]

Since 1923 the immersion and sprinkling methods of disinfection against wheat bunt (*Tilletia tritici*) [*T. caries*: *R.A.M.*, 2, p. 557] have been largely superseded by the short disinfection process and more especially by dusting [ibid., 6, p. 475 *et passim*]. The scope of the author's studies at Brunswick has been extended, therefore, to include these procedures and also 102 more efficient and economical compounds [cf. above, p. 547]. Of these 99 were organic and corresponded to the formula R–Hg–X, with R representing an organic radicle and X an acid, hydroxyl, or other group. The organic alone was of any importance in relation to the fungicidal efficacy of a given compound.

In the short disinfection process all the compounds had to be applied at concentrations greatly exceeding those required for immersion in order to obtain comparable results. Thus, the consumption of mercury per 100 kg. seed averaged five times as much by the former as by the latter procedure. With dusting the situation was even less favourable, some 20 times as much mercury being used.

The compounds fell into six groups, viz., A comprising those with aliphatic hydrocarbon groups, B substituted aliphatic hydrocarbons, C unsubstituted aromatic hydrocarbons, D unsubstituted hydroaromatic hydrocarbons, E other organic mercury compounds, and F inorganic mercury compounds. Of the 68 in group A, the methyl mercury compounds proved to be the most effective, with a very low *dosis curativa*, and practically innocuous to the seed in all methods of treatment. They were closely followed by members of the ethyl section, but the propyl- and butyl-mercury compounds combined a high degree of fungitoxicity with an exceptionally deleterious effect on the seed. The *doses curativae* of the five representatives of group B, viz., methoxyethyl mercuric chloride, ethylene chlorohydrin mercuric bromide, ethylene chlorohydrin mercuric chloride, ethylene chlorohydrin mercuric iodide, and ethanol mercuric chloride, were uniformly higher than those of group A, but since the *dosis toxica* was also higher the chemotherapeutic index is favourable. The phenyl mercury compounds of group C, including the acetate, chloride, and salicylate, are highly effective in the immersion treatment and were allotted a very good chemotherapeutic index, but their application in short disinfection and dusting gave less satisfactory results than those obtained in A and B. The performance of the compounds comprising groups D, E, and F was inadequate. For all the compounds tested the chemotherapeutic index was lowest, and consequently most favourable, in the immersion process.

The application of overdoses of the methyl, ethyl, propyl, and butyl mercury compounds in group A and of cyclohexyl mercury in group D resulted in the development of peculiar abnormalities, connected with polyploidy, in the wheat seedlings.

In certain circumstances the fillers used for the dilution of fungicides may invalidate the experimental data and lead to errors in the chemotherapeutic assay

of the compounds. For this reason soda is only conditionally applicable as a diluent and sodium thiosulphate should be excluded altogether in tests designed to determine the efficiency of organic mercury compounds.

Ciferri (R.). **Revisione dei metodi di controllo biologico proposti per gli anticrittogamici e metodi adottati in Italia.** [A revision of the methods of biological control proposed for fungicides and methods adopted in Italy.]—Reprinted from *Atti Ist. bot. Univ. Pavia*, Ser. 5, 10, 23 pp. 1952. [French, English, and German summaries.]

The author describes briefly, with the aid of the literature (over 100 titles), methods of controlling plant diseases by fungicides containing little or no copper developed in Italy [*R.A.M.*, 25, p. 435] since the war owing to the copper shortage, under the following headings: (*a*) laboratory experiments, (*b*) phytotoxicity tests, and (*c*) experiments on artificially infected plants. It is suggested that work on fungicides should be organized on an international basis.

Marchionatto (J. B.). **La lucha quimica contra las plagas de la agricultura.** [Chemical control of pests in agriculture.]—*An. Soc. cient. argent.*, 153, 4, pp. 161–176, 1952.

This paper, read at a conference of the Scientific Society of Argentina, 24th October, 1951, is a general discussion on insecticides, fungicides, and herbicides from the aspects of their history, current specific uses, and the establishment of a national industry in these products in Argentina.

Polunin (N.) & Kelly (C. D.). **Arctic aerobiology. Fungi and bacteria, etc., caught in the air during flights over the geographical North Pole.**—*Nature, Lond.*, 170, 4321, pp. 314–316, 1952.

Details are given of flights between central Alaska and the North Pole in September, 1948, and March, 1949 [see next abstract], using the sampling methods already described [*R.A.M.*, 31, p. 504]. The first flight, using Petri dishes coated with silicone grease, indicated that, although the air above and around the Pole may tend to be practically sterile, a few bacteria and an occasional yeast were trapped in a viable condition. The atmosphere appeared to be entirely sterile about 25,000 ft. above sea level over the vicinity of the Pole. From the second flight it appeared that the air at the highest latitudes and even well south may be judged by ordinary standards to be virtually sterile in winter.

The electrostatic sampler and filters [loc. cit.] usually gave very different results, the latter sometimes yielding ten times more isolates. A 'lumping' of methods and groups gave an average of 1·49 bacterial and fungal colonies per cu. ft. on 28th March taken mainly in Pacific maritime air with a trajectory over Kamchatka, eastern Siberia, and interior Alaska, whereas similar lumping of colonies obtained from the entire North Pole flight which began on the following day in air of relatively unfavourable northern origin gave 0·496.

Polunin (N.). **Seeking airborne botanical particles about the North Poles.**—*Svensk bot. Tidskr.*, 45, 2, pp. 320–354, 6 figs., 4 maps, 1951.

Most of this information concerning the trapping of air-borne particles in flights over the Arctic and north-western Canada from 1947 to 1949 has already been noticed from other sources [*R.A.M.*, 27, p. 248; 28, p. 133; 30, p. 56; 31, p. 28 and preceding abstract]. The electrostatic sampler was employed in flights made in July and August, 1949, and the material trapped on two silicone-smeared slides stuck in the bottom of a Petri dish. The following figures were obtained for colonies developing per cu. ft. of air in July: Ottawa to Winnipeg 0·91 bacteria and 5·16

fungi, Winnipeg to Churchill 0·35 and 0·47, Churchill to Baker Lake and back 4·2 and 2·86, about Churchill 0·79 and 0·78, Winnipeg to Montreal 0·45 and 1·31; and in August: Montreal to Winnipeg 0·55 and 2·45, Winnipeg to Edmonton 1·36 and 12·9, Edmonton to Whitehorse and back 0·46 and 1·27, Edmonton to Winnipeg 0·68 and 7·34, and Winnipeg to Ottawa 0·94 and 5·6.

Rajan (B. S. V.), Nigam (S. S.), & Shukla (R. K.). **A study of the atmospheric fungal flora at Kanpur.**—*Proc. Indian Acad. Sci.*, Sect. B, 35, 1, pp. 33–37, 1 graph, 1952.

The results of a census of atmospheric fungi covering the period from July, 1945, to June, 1946, at Kanpur, India [cf. above, p. 540], are described and tabulated. Using the culture plate method [cf. *R.A.M.*, 29, p. 40] 38 species were recorded, with *Aspergillus niger*, *A. glaucus*, *A. fumigatus*, and other *A.* spp. predominating, while among others represented were species of *Acrothecium*, *Alternaria*, *Curvularia*, *Fusarium*, *Helminthosporium*, *Mucor*, *Penicillium*, *Stemphylium*, and *Verticillium*, *Pullularia pullulans*, and *Rhizopus stolonifer*. The organisms were generally more prevalent at a height of 8 than at 4 ft. The counts were substantially lower from July to September and again in December and January than in any other month of the year, the maximum incidence occurring in November and May. Most of the preponderantly cellulolytic atmospheric fungi are those usually found on deteriorated cotton materials [ibid., 29, p. 272; 30, p. 60 *et passim*].

Pontecorvo (G.). **Non-random distribution of multiple mitotic crossing-over among nuclei of heterozygous diploid Aspergillus.**—*Nature, Lond.*, 170, 4318, pp. 204–205, 1952.

Cultural experiments at the Department of Genetics, University of Glasgow, have shown that somatic or mitotic crossing-over occurs in nuclei of the asexual *Aspergillus niger*, diploids heterozygous for known markers giving mitotic recombinants homozygous for one or more of these markers. This was shown to occur regularly in species with an exclusively or mainly haploid life-cycle where diploid nuclei are formed.

Webster (J.). **Spore projection in the hyphomycete Nigrospora sphaerica.**—*New Phytol.*, 51, 2, pp. 229–235, 1 pl., 1 diag., 1952.

Violent spore discharge [*R.A.M.*, 18, p. 405], a rare phenomenon in the Hyphomycetes, is described in *Nigrospora sphaerica*. As a result of the liquid discharge from the ampulliform cell through the fine orifice at its apex the conidia are projected vertically to a distance of 2 cm. and horizontally to 6·7 cm. The efficacy of the discharge mechanism is compared with that of *Psalliota* and *Entomophthora*.

Lodder (J[acomina]) & Kreger-van Rij (N. J. W.). **The yeasts—a taxonomic study.**—xi+713 pp., 268 figs., Amsterdam, North-Holland Publishing Company, 1952. £6. 10*s*.

In this comprehensive work [cf. *R.A.M.*, 31, p. 354] an introductory chapter is followed by one (pp. 6–35) dealing with the characters used in the authors' classification, other properties applied by various investigators being discussed. Chapter III (pp. 36–50) surveys the different types of variation occurring in yeasts and discusses their significance for yeast taxonomy. In Chapter IV (pp. 51–76) the main lines of classification up to the genera are given. Discussion of the species accepted in the various genera follows for the three families recognized, Endomycetaceae, Sporobolomycetaceae, and Cryptococcaceae, in Chapters V, VI, and VII, respectively (pp. 77–667). Synonyms and the original description of the species are followed by a standard description; details on the origin of the cultures are added, and at the end of the discussion of each genus are bibliographical references.

Each of these three chapters begins with a key to the genera; there are also keys to the species.

The authors' main principle is to give first rank to morphological characters; in species differentiation physiological properties are widely used. Though some species may show a somewhat heterogeneous complexity they are readily determinable by means of the authors' standard examination procedure. The primary classification into genera is based mainly on vegetative and sexual reproduction. For subdivision into species fermentation and sugar assimilation are assigned an important part. Carbon assimilation tests are confined to glucose, galactose, saccharose, maltose, lactose, and ethanol. The ability or inability to use nitrate as the sole nitrogen source is important in the authors' specific differentiation and is used occasionally in generic differentiation. The ability to split arbutin or esculin is considered of value only in special cases. The cultures studied were all maintained on malt agar.

Debaryomyces is given as nom. cons. prop. In *Lipomyces* n.gen. the number of ascospores ranges from four to 16 or more, and ability to ferment sugars is completely lacking. The two species belonging to this genus both produce fat abundantly. The type species is *L. starkeyi* n.sp., isolated from various soils by Starkey. *Torulopsis pinus* n.sp. was isolated by Lagerberg in Sweden from heartwood of living pines and was received from Stockholm in 1935. There are 15 new species, one new variety, and many new combinations.

Mathur (R. L.). **Lysis in the germination of the urediospores of Ravenelia sessilis.** —*Sci. & Cult.*, 17, 9, pp. 380–381, 1 fig., 1952.

In a study at the Department of Agriculture, Bharatpur, India, uredospores of *Ravenelia sessilis*, very common on *Albizzia lebbek* in Rajasthan [cf. *R.A.M.*, 26, p. 266], were smeared on water agar containing various concentrations of colloidal sulphur [ibid., 31, p. 446] and incubated at 15° C. No germination occurred at concentrations of 50, 20, and 10 p.p.m. At 5 p.p.m. the spores lysed before the formation of germ-tubes, while at 2 p.p.m. 60 per cent. lysed before and 40 per cent. after their inception. At 1 p.p.m. the spores formed tubes 40 to 50 μ long as against 200 μ in the untreated.

Thomas (R. M.) & Prier (J. E.). **An improved lyophilizer.**—*Science*, 116, 3004, p. 96, 1 fig., 1952.

An efficient, strong, and inexpensive piece of apparatus for lyophilization of cultures [*R.A.M.*, 28, p. 634] has been developed at the Department of Veterinary Science and Bacteriology of the University of Wyoming. It is essentially a metal Dewar flask with 24 nipples $\frac{1}{2}$ by 2 in. welded to the sides for the attachment of culture-drying vials, and is constructed as follows. A steel pipe 23 by 3 in. acts as the condenser chamber and is welded in the centre of a 24 by $7\frac{1}{2}$ in. cylindrical tank, to the inside of which metal fins $\frac{1}{4}$ by $1\frac{1}{2}$ in. have previously been welded. The vacuum exhaust pipe, $\frac{1}{2}$ by 23 in., attached to the inside of the condenser pipe, acts as a second trap, removing any moisture before it reaches the vacuum pump. Ethyl alcohol or a 50 per cent. ethylene glycol-water mixture is used as a carrier in the condenser with a dry-ice refrigerant. A ring-shaped pan, a separate unit 22 in. outside diameter and 12 in. inside, conforms to the tank shape and is filled with ethylene glycol. The efficiency of the apparatus lies in the greater condenser surface and the short distance from the condenser to the culture tubes.

Costa (A. S.). **Emprêgo de carborundo em inoculações com Sphaceloma.** [Use of carborundum in inoculations with *Sphaceloma*.]—*Bragantia*, 10, 1, pp. 35–36, 1 fig., 1950. [English summary.]

In the course of transmission experiments with the virus causing mosaic of

Euphorbia prunifolia in São Paulo, Brazil [*R.A.M.*, 29, p. 493], many of the leaves on plants inoculated by rubbing, supplemented by abrasion with carborundum [cf. ibid., 31, pp. 114, 474], developed typical anthracnose lesions, suggesting the presence in the sap of spores of *Sphaceloma krugii*. Comparing three methods of inoculation with the fungus on 208 leaves, namely, spraying with a culture suspension, rubbing, and rubbing plus carborundum, the numbers contracting infection were 0, 24, and 52, respectively.

Wilkins (W. H.). **Investigation into the production of bacteriostatic substances by fungi. Preliminary examination of the eleventh 100 species, all Basidiomycetes.** —*Brit. J. exp. Path.*, 33, 1, pp. 46–47, 1952.

Strongly positive reactions to tests by the 'Wilkins revised' method for antibiotic activity against *Bacterium coli* and *Staphylococcus aureus* were given by the following basidiomycetes [*R.A.M.*, 30, p. 382]: two strains each of *Clitocybe aurantiaca* [cf. ibid., 27, p. 438], *Poria xantha* [ibid., 26, p. 504], and *Psalliota xanthoderma*, and one strain each of *Collybia butyracea* [cf. ibid., 29, p. 45], *Coprinus picaceus* [ibid., 30, p. 383], *Fomes annosus* [ibid., 28, p. 348], and *Inocybe geophylla* [cf. ibid., 27, p. 46]. A further 14 species and strains were characterized as 'weakly positive'.

Brian (P. W.), Curtis (P. J.), Howland (S. R.), Jefferys (E. G.), & Raudnitz (H.). **Three new antibiotics from a species of Gliocladium.**—*Experientia*, 7, 7, p. 266, 1951. [German summary. Received April, 1952.]

A species of *Gliocladium* [*R.A.M.*, 31, p. 142] belonging to the *G. roseum* series [ibid., 27, p. 487], but distinct from other strains of that species, was isolated from a soil sample obtained from a vigorous young pine plantation at Wareham, Dorset, in January, 1948. From the mould cultures were isolated three distinct antibiotics for which the names rubrogliocladin, aurantiogliocladin, and gliorosein are proposed. In germination tests at the Butterwick Research Laboratories, Welwyn, Herts, the minimum inhibiting concentrations in μgm. per ml. against spores of *Botrytis allii* were 50, 50, and >400 for each substance, respectively, and 50 for hydroquinone III, isomeric with gliorosein.

Bose (R. G.). **A comparative study of the microbiological decomposition of some cellulosic fibres.**—*Sci. & Cult.*, 17, 10, pp. 435–436, 1952.

In studies at the Indian Jute Mills Association Research Institute, Calcutta, on the extent of fungal and bacterial degradations undergone by 14 cellulosic fibres [*R.A.M.*, 30, p. 529; 31, p. 506], flasks containing 0·5 gm. dried fibre and 10 ml. Czapek-Dox salt solution were inoculated with 0·5 ml. of soil suspension and 0·5 ml. of a mixed spore suspension of *Aspergillus flavus*, *A. niger*, *A. terreus*, *A. fumigatus*, *A. sydowi*, *Penicillium citrinum*, *P. vermiculatum*, *P. variabile*, *P. rubrum*, *Paecilomyces varioti*, *Trichoderma viride*, *Chaetomium indicum*, *C. globosum*, *Curvularia lunata*, *Memnoniella echinata*, and *Myrothecium verrucaria* and incubated at 30° C. Flasks inoculated with soil suspension only showed no fungal growth, damage to the fibres being due to aerobic soil bacteria. Results taken after 21 days on the basis of loss in dry weight indicated that coir (coco-nut fibre), rich in hemicellulose and protected by its high lignin content (about 35 per cent.), and sisal and Manila hemp (*Musa textilis*), all three highly resistant to bacteria and the first also to fungal damage, should be suitable for products likely to be wetted frequently. Viscose rayon, the only synthetic fibre tried, was highly susceptible to both fungi and bacteria, while cotton is very susceptible to the latter only. The lignified fibres are usually more resistant to bacteria than to fungi, though the degree of protection is not proportional to the lignin content of the fibres. Thus tossa jute

(*Corchorus olitorius*) is more resistant to fungal attack than white jute (*C. capsularis*) or mestha (*Hibiscus cannabinus*), though all three are similar chemically.

Goehde (H. L. v.). **Copper as a textile fiber preservative.**—*Amer. Dyest. Reptr*, 41, 6, pp. 164, 179, 1952.

From a perusal of ten important contributions of the last 15 years to the subject of impregnating fibrous materials with copper compounds, supplemented by personal investigations, the author concludes that, of all the radicals coupled to copper, 8-hydroxyquinoline [*R.A.M.*, 27, p. 147] exerts the most powerful fungistatic action. Using the compound at the maximum copper content of 10 per cent. in an emulsion with strongly penetrative qualities, spooled fibres may be impregnated with optimum uniformity.

Marshall (C. R.) & Walkley (V. T.). **Some aspects of microbiology applied to commercial Apple juice production. I. Distribution of microorganisms on the fruit. II. Microbiological control of processing. III. Isolation and identification of Apple juice spoilage organisms. IV. Development characteristics and viability of spoilage organisms in Apple juice. V. Thermal death rates of spoilage organisms in Apple juice.**—*Food Res.*, 16, 5, pp. 448–456; 6, pp. 515–521, 1 diag., 1951; 17, 2, pp. 123–131; 3, pp. 197–211, 1952.

During the past four years the writers have been engaged on a study of various aspects of the microbiology of apple juice production at a factory in Gloucestershire using the Boehi method of storage in bulk under carbon dioxide pressure. A technique was developed to assess the number of micro-organisms present on the fruits. During growth and maturity on the tree the superficial yeasts and bacteria were found to undergo a continual change in population density. In sound fruits micro-organisms are not confined to the cuticle but extend, in a lesser degree, to the core. Yeasts do not occur in the flesh unless there has been either internal or external breakdown through fungal activity, when they may be detected in areas still free from mould contamination. Apples with yeast and mould counts in excess of 2,000,000 and 200,000, respectively, may be classed as damaged and above 5,000,000 the fruit is unsuitable for processing. It is pointed out, however, that these criteria are purely arbitrary and not necessarily applicable to fruit grown in orchards outside the area covered by this survey. If processing is rigidly controlled and adequate precautions are taken to arrest the development of micro-organisms contamination of the juice should diminish progressively throughout the several stages, at each of which routine counts should be made to control the efficiency of the plant and ensure its maintenance in a sanitary condition.

A list is given of organisms which were isolated from apples and expressed juice at the various stages [cf. *R.A.M.*, 25, p. 74]. Apart from the yeasts most of the isolates examined were unable to develop in the presence of 0·75 vol. carbon dioxide, but *Botrytis cinerea* and *Oospora candida* made limited growth and *O. lactis* was only slightly affected. All the species of *Penicillium* isolated were completely inhibited at 0·25 vol. carbon dioxide.

In Great Britain the customary temperature range for pasteurization of bottled apple juice is 145° to 152° F. The former was selected for the current investigations, the results of which demonstrated the adequacy of a total heating time of 30 minutes (23 minutes warming-up and seven holding) for efficient pasteurization of juice in 7-oz. bottles. Organisms surviving a 25-minute period included *Mucor hiemalis*, *P. crustosum*, *P. viridicatum*, *P. spinulosum*, *Cladosporium herbarum*, *B. cinerea*, and *O. candida*.

Czech (M.) & Nothdurft (W.). **Untersuchungen über Schädigungen landwirtschaftlicher und gärtnerischer Kulturpflanzen durch Chlor-, Nitrose- und Schwefel-dioxyd-gase.** [Investigations on injuries to cultivated agricultural

and horticultural plants from chlorine, nitrogen peroxide, and sulphur dioxide gases.]—*Landw. Forsch.*, 4, 1, pp. 1–38, 35 figs. (31 col.), 1952.

This is a valuable contribution to the understanding of the damage inflicted on crops by factory fumes [cf. *R.A.M.*, 31, p. 135]. It comprises a detailed account of the methods and results of laboratory and field experiments forming part of the 1950 research programme of the Farbwerke Hoechst, A.G., Frankfurt-am-Main, Germany, to determine the reactions to fumigation with different concentrations of chlorine, nitrogen peroxide, and sulphur dioxide gases, e.g., of winter rape, winter rye, winter wheat, winter barley, oats–peas, sugar beet, early potatoes, lucerne, lettuce, dwarf beans (*Phaseolus nanus*) [*P. vulgaris*], spinach, *Begonia gracilis*, *Hydrangea opuloides*, *Primula malacoides*, *P. obconica*, *Asparagus sprengeri*, and *Erica carnea*. The two last-named were highly resistant and immune, respectively.

Morquer (R.) & Montant (C.). **Déterminisme de la formation des spores chez le Trichothecium roseum (Persoon) Link.** [Determinism in spore formation in *Trichothecium roseum* (Persoon) Link.]—*C.R. Acad. Sci., Paris*, 234, 2, pp. 241–243, 1952.

Sporogenesis in *Trichothecium roseum* comprises the formation of (1) dry macroconidia (xerospores), the constant production of which is stimulated by a high concentration of glucides within the temperature range of 4° to 32° C., and (2) slimy microconidia (myxospores), promoted by simple proteins (asparagine, glycocol, tryptophane, and egg albumin) above 28°. Macroconidial production is retarded by glycerol in the presence of asparagine and intensified by maltose, saccharose, glucose, and mannitol. Maltose, saccharose, and mannitol also exert a similar influence on the output of micronidia. The production of microconidia by *T. roseum* is dependent on the carbon-nitrogen ratio lying between 13 and 21·5, whereas macroconidial development is compatible with the very wide range of 0·4 to 439 with an optimum at 13.

Völk (J.), Bode (O.), & Hauschild (I[rmgard]). **Untersuchungen zur Frage eines Zusammenhanges zwischen Düngung, Blattlausbesatz und Krankheitsausbreitung in Kartoffelbeständen. I. Mitteilung.** [Studies on the question of a correlation between manuring, aphid colonization, and disease dissemination in Potato stands. Note 1.]—*Z. PflKrankh.*, 59, 3–4, pp. 97–110, 1 diag., 5 graphs, 1952. [English summary.]

Further field trials at the Institute for Virus Research, Celle, Hanover, confirmed previous observations as to enhanced susceptibility to potato leaf roll virus of potato crops supplied with a potassium chloride soil amendment [*R.A.M.*, 31, p. 201 and above, p. 533]. No correlation could be detected between density of colonization by *Myzus persicae* and susceptibility to leaf roll, nor did the winged forms of the aphid appear to prefer the plots fertilized with potassium chloride or remain there longer than on those treated otherwise. These results corroborate the conclusion already reached, namely, that the fertilizer does not actually stimulate aphid colonization but modifies the constitution of the plant in such a way as to increase its receptivity for the leaf roll virus.

Sprau (F.). **Weitere Untersuchungen zur hydroponischen Augenstecklingsprüfung.** [Further studies on the hydroponic testing of eye cuttings.]—*Pflanzenschutz*, 3, 10, pp. 126–128, 5 figs., 1951.

Further observations on the hydroponic method of testing potato eye cuttings for virus diseases [see above, p. 533], using ten varieties, substantiated the conclusion already reached as to the insufficiency of the procedure, which can merely serve, pending further improvements, as a useful adjunct to soil culture.

CHATTOPADHAYAY (S. B.). **Control of late blight of Potato in the hills of Darjeeling district, west Bengal.**—*Sci. & Cult.*, 17, 9, pp. 379–380, 1952.

Studies on the control of potato blight (*Phytophthora infestans*) [*R.A.M.*, 31, pp. 370 and above, p. 540] in the Darjeeling district, India, indicated that Bordeaux mixture cannot be recommended with safety in spite of its efficiency and high tenacity as it tends to be phytotoxic. Perenox at 3–100 gave control but the need for several applications increased the cost of spraying. Dithane D14 (½ gal. per 100 gals. water+1½ lb. zinc sulphate and ½ lb. lime) and dithane Z78 (2 lb. to 100 gals.) have proved fairly tenacious in the hills of Darjeeling district during the past three years, particularly D14, a sticker being unnecessary. They were practically non-phytotoxic not only to potatoes but also to maize and peas which are often grown with potatoes and are susceptible to copper damage. Frequent applications produced no stunting; on the contrary vegetative growth was encouraged. Blight was controlled and new foliage produced even when sprays were applied after disease onset, D14 being more effective than Z78. Yield increases of 25 to 35 per cent. were obtained. As the result of three years' intensive spraying the general incidence and severity of blight have been reduced considerably.

MÜLLER (K. O.). **Report to the Government of Chile on Potato blight in Chile.**—*Rep. F.A.O., Rome*, 28, ii+35 pp., 8 pl., 1952. [Mimeographed.]

Between September, 1951, and February, 1952, the author, at the request of the Food and Agriculture Organization of the United Nations, carried out investigations in southern Chile, mainly at the Centinela Station, into the biology of the potato blight organism (*Phytophthora infestans*) under Chilean conditions. The disease appeared on an epidemic scale only very recently in Chile [C.M.I. map No. 109] and spread rapidly.

The probable means of introduction of *P. infestans* are discussed, air-borne entry being ruled out. Until very recently Chile did not import potatoes, and the probability that infection was introduced on imported tubers appears slight. Information from growers indicated that the disease was present at the end of 1949, and there is no doubt that the fungus had already been established in the country for at least a year before being recognized. In the summer of 1950–1 numerous plots between latitudes 30° and 43° were infested, and it is highly improbable that such wide distribution could occur in one year. Primary infection probably occurred in southern Chile, in Chiloé or the neighbouring islands. Introduction into this area, the chief source of supply of seed potatoes for the whole country, explains the rapid spread that occurred. The indications are that the disease was introduced on potatoes brought in by casual workers returning to Chiloé and the neighbouring islands from Argentina.

The severe and widespread infestations in the La Serena district, where the mean precipitation is only 13·33 cm. per annum, indicates that the commonly held opinion that frequent precipitation is a pre-condition for blight does not apply to areas with high air humidity (mean annual relative humidity in La Serena, 80 per cent.), dew deposition being adequate for infection. The relatively low day and night temperatures (annual mean temperature, 14·8° C.) favour blight development.

Investigations indicate that the southern provinces will be affected every year, since the disease was rather abundantly present in these regions in the abnormally dry season of 1951–2, when the most severe losses occurred in La Serena and the provinces of Chiloé, Llanquihue, Osorno, Valdivia, and Cautín, which together contain over half the potato area. The mean loss was estimated to be at least 40 per cent. of the potential yield and at least 23 per cent. of the normal. Actually, the losses must have been much greater, as large areas in central Chile, also rather severely affected, were not included in the estimate. Exports (including 'seed')

from Chiloé to the mainland, which formerly amounted to some 26,000 tons per year, were only about 10,000 tons in 1951. At least 80 per cent. of the potatoes grown are of the Corahila 'variety', which becomes infected exceptionally early in the season and spread is very rapid.

The number of wild species so far collected in Chile is small and the two chief ones, *S. brevidens* and *S. maglia* [*R.A.M.*, 31, p. 254], are susceptible to the strains of group A. However, systematic research in this direction should be carried out.

In the coastal regions of La Serena there are three different periods of potato-growing covering the whole year; hence hosts are available throughout that time. This unbroken cycle of infections was observed in many localities. Winter crops appear to be the chief source of infection, though cull piles of half-rotten tubers may also provide inoculum in the early season. A close correlation was found between the time for the disease to reach epidemic proportions and proximity of the crop to the nearest farm. Naturally infected *S. brevidens* plants were found in early spring, the fungus having survived the cold season on this host. *S. crispum* and *S. syringifolium*, both very common, were susceptible in laboratory tests.

For control it is recommended that winter production should be discontinued in the south. Protective spraying should be carried out when local observations indicate that an outbreak is imminent. Where this would at present be uneconomic improved cultural practices must be adopted first. By combining the characters of recently introduced, resistant varieties with those of indigenous ones, new improved types of potato can be developed.

'Short' and 'long' term action programmes are outlined and three appendices deal, respectively, with suggestions for the adjustment of the breeding work of the Centinela Station to the blight situation [loc. cit.], the production and certification of seed potatoes, and the establishment of research fellowships.

[This report is also published in Spanish.]

Alvaro Montaldo (B.). **Producción de semilla de Papa.** [Production of seed Potatoes.]—*Agricultura tec., Santiago*, 10, 1, pp. 32–42, 1950. [English summary. Received August, 1952.]

The low yields of seed potatoes in Chile revealed by an analysis covering the decade from 1939 to 1949 are attributed in part to common scab (*Actinomyces scabies*) [*R.A.M.*, 21, p. 470] and powdery scab (*Spongospora subterranea*) [loc. cit.]. A system of seed certification was promulgated but met with little success owing to fluctuating prices and lack of commercial interest in the varieties available under the scheme. There is, however, still an area of virgin soil, estimated at 8,000 ha., where the crop could easily be established. Details are given of the results obtained at the Centinela Experiment Station, Puerto Octay, with introduced varieties during the past eight years. President, Alpha, and Industrie produced the highest yields. Majestic and Sequoia were free from *A. scabies*, Royal Kidney, Sebago, and Sequoia from *Alternaria solani*, but none from *S. subterranea*.

Hey (A.). **Untersuchungen über die Anfälligkeit von Kartoffelsorten gegen den Krebsbiotyp G.** [Studies on the susceptibility of Potato varieties to the wart biotype G.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., 5, 12, pp. 226–231, 1951.

Köhler's studies on the behaviour of 'normal' biotypes of *Synchytrium endobioticum* on different potato varieties in Germany are discussed in relation to the conflicting results of experiments with biotype G [*R.A.M.*, 29, p. 529; 30, p. 285]. Laboratory findings relative to the grade of infection developing on varieties and selections inoculated with fresh warts of G are compared with the data collected in field experiments covering periods up to eight years. A six-grade scale of infection was set up, taking as a criterion the weight ratio of fresh excrescences to the

proportion of sound tubers. By this means it was shown that the infection grade of biotype G must be evaluated differently from that of the 'normal' physiologic races. Thus, all the varieties contracting types of infection in the laboratory represented in the scale by grades 3 to 5 (101 to 500, 11 to 100, and 0 to 10 sound tubers, respectively), proved susceptible in the field, while even some of those in grade 2 (501 to 2,500 sound tubers) developed tumours under optimal conditions. Compared with the 'normal' biotypes of *S. endobioticum*, the toxicity of G appears to be slighter, whereas its stimulatory action on the physiology of the host, expressed by the production of neoplasms, is disproportionately greater. The parasitic relationship of variety to race does not seem to correspond invariably to Köhler's scale of infection, judging by the reactions in these experiments of Sickingen, the average grade of which in the laboratory was 3 and its maximum in the field 1 (more than 2,500 sound tubers). Besides Fram, Frühe Hörnchen, and Hilla (with laboratory grades of 1, 2, and 1, respectively) 15 productive selections were found to be immune (grade 0) in several years' field trials.

Wenzl (H.). **'Blattdürre' der Kartoffel als Erscheinungsform der Colletotrichum-Welkekrankheit (vorläufige Mitteilung).** ['Leaf scorch' of Potato as a symptom of the *Colletotrichum*-wilt disease (preliminary note).]—*PflSchBer.*, 8, 1–2, pp. 11–14, 1952. [English summary.]

The frequent occurrence in eastern Austria of potato tubers with adherent stolon residues, as well as the presence of spindle sprout in stands with slowly withering shoots, afford further confirmation of the close connexion between this form of leaf scorch and the typical wilt caused by *Colletotrichum atramentarium* [*R.A.M.*, 31, p. 81]. In a 1951 crop of Allerfrüheste Gelbe with 125 plants with typical wilt, 75 leaf scorch, and 75 healthy, the percentages of adherent stolon remnants were 53·3, 45·1, and 6·9, respectively. The 'normal' germination percentages in May, 1951, of tubers from a 1950 stand of the same variety having typically wilted plants, those with leaf scorch, and healthy were 5, 1, and 37·1, respectively; 'medium' germination (denoting reduced vitality and probably slight infection in the ostensibly sound tubers) being 7·7, 11·5, and 62·1 and with spindle sprouts 92·3, 87·5, and 0·8: they produced, respectively, 376, 494, and 596 tubers, the weights in kg. being 11·78, 16·99, and 22·97.

Patel (M. K.), Kulkarni (N. B.), & Kulkarni (Y. S.). **Ring disease of Potato in India.**—*Curr. Sci.*, 21, 2, pp. 47–48, 1952.

At the College of Agriculture, Poona, the writers investigated the opinion expressed by some research workers that ring disease of potato in India is attributable to *Aplanobacter* [*Corynebacterium*] *sepedonicum* and not, as hitherto supposed, to *Phytobacterium* [*Pseudomonas*] *solanacearum* [*R.A.M.*, 26, p. 440]. Bacterial isolates from several potato varieties collected in different parts of the country were compared with the two organisms in question and found to agree with *P. solanacearum* in pathogenicity, morphological, cultural, and biochemical characters. It is stated that the disease has ceased to be of importance in Bombay State, since seed potatoes are imported annually from the Simla hills (altitude 7,000 ft.) where the disease is not present.

Yoshino (M.) & Yamamoto (T.). **Pathogenicity of the chlamydospores of the Rice false smut.**—*Agric. & Hort., Tokyo*, 27, pp. 291–292, 1952. [Japanese.]

Inoculation experiments with chlamydospores and ascospores of *Ustilaginoidea virens* [*R.A.M.*, 31, p. 455 and next abstract] were carried out on rice plants at the booting, flowering, and soft-dough stages in the greenhouse. Of the different inoculation methods used, e.g., dusting with chlamydospore masses, spraying with

spore suspensions, and pouring or injecting the spore suspension into the leaf-sheath cavity at the booting stage, only injection was successful.

HASHIOKA (Y.). **Application of new fungicides to Rice cultivation.**—*Agric. & Hort., Tokyo*, 27, pp. 485–492, 1952. [Japanese.]

Slurry disinfection of rice seeds with ceresan (0·2 per cent. of seed weight) is almost as effective against blast (*Piricularia oryzae*) [*R.A.M.*, 31, p. 204 and next abstract] and brown spot (*Cochliobolus* [*Ophiobolus*] *miyabeanus*) [ibid., 31, p. 294] as immersion in uspulun, while arasan slurry is very inferior both in fungitoxicity and effect on seedling growth.

Spraying with dithane Z78 (0·5 per cent.) in the field does not control sheath rot (*Hypochnus* [*Corticium*] *sasakii*) [ibid., 27, p. 447] as well as do Bordeaux mixture or uspulun at the same strength. Copper dusts tend to be injurious when dusted on the young panicles just after heading or during flowering, and should not be applied to the foliage or to the ears after the soft-dough stage. False smut (*Ustilaginoidea virens*) [see preceding abstract] can be combated only by spraying or dusting a few days before heading.

SAKAMOTO (M.). **On the new method of inoculation on Rice plants with the blast fungus.**—*Rep. Inst. agric. Res. Tôhoku Univ.*, 1–2, pp. 15–23, 1 pl., 1950. [Received March, 1952.]

By a method developed at the Institute for Agricultural Research, Tôhoku University, Sendai, Japan, for inoculating rice plants with the blast fungus (*Piricularia oryzae*) [see preceding abstract] a sheath section 7 to 10 cm. long from which the culm has been carefully removed is filled with a dilute spore suspension and incubated in a moist chamber. The discoloured ends of the sheath are then cut off and the epidermal layer stripped and examined under a microscope. When sheath tissues of various varieties were treated in this way and incubated for 48 hours at 24° to 28° C., the number of cells invaded in the Shinriki and Norin No. 1 (susceptible) varieties was 401 and 442; Norin No. 16 and Kameji [*R.A.M.*, 31, p. 204] (resistant) 380 and 352; and Futaba (very resistant) 213. A sheath of Bozu No. 5 (rather susceptible) was cut in half lengthwise, one half being treated with dilute ammonia solution for six hours at 24° and the other with distilled water. After incubation for 42 hours at 24° the number of cells invaded in each half was 359 and 241, respectively.

This method is also suitable for studying other diseases of gramineous plants.

HASHIOKA (Y.). **Varietal resistance of Rice to the 'bakanae' disease. Studies on pathological breeding of Rice, V.**—*Jap. J. Breed.*, 1, pp. 167–171, 1952. [Japanese, with English summary.]

Using nearly 200 rice varieties indigenous in different latitudes of Asia, inoculation experiments were performed with *Gibberella fujikuroi* [*R.A.M.*, 30, p. 240] by immersion of the seeds in a conidial suspension, injection of the suspension into the stems of plants at tillering, and spraying the panicles one day after flowering. Immersion proved to be the most convenient for comparisons of resistance to the disease. Abnormal elongation [loc. cit.] was observed less frequently in the varietal groups originating in the temperate regions, i.e., the Japanese lowlands and uplands, e.g., Horai [ibid., 30, p. 190], central China, etc., than in those of tropical provenance, such as Indo-China, Malaya, Formosa (native), south China, and Hainan.

SHARP (C. C. T.). **Progress of breeding investigations with Hevea brasiliensis II.**—*J. Rubb. Res. Inst. Malaya*, 13, Communication 275, pp. 73–99, 1951. [Received June, 1952.]

The results of breeding and selection of *Hevea* rubber in Malaya started between

1937 and 1941 (*J. Rubb. Res. Inst. Malaya*, 10, Communication 248, pp. 34–66, 1 graph, 1940) are presented up to the end of 1950. Seedlings of Avros 157 appear to be less susceptible to brown bast [*R.A.M.*, 27, p. 336; 30, pp. 191, 512; 31, p. 400] than those of Tj.1. Prang Besar 49 seedlings also show comparatively low incidence of the disorder.

Marston (H. R.). **Cobalt, copper and molybdenum in the nutrition of animals and plants.**—*Physiol. Rev.*, 32, 1, pp. 66–121, 1952.

A bibliography of 828 titles forms the basis of this survey of the functions of cobalt, copper, and molybdenum in animal and plant metabolism, mention of which has been made from time to time in this *Review*.

Nelson (R.). **Verticillium wilt of Peppermint.**—*Tech. Bull. Mich. agric. Exp. Sta.* 221, 259 pp., 34 pl. (8 col.), 2 graphs, 1950.

In this record of investigations made during the last 25 years on *Verticillium* wilt (*V. albo-atrum* var. *menthae* n. var.) of peppermint (*Mentha piperita*), the chief cause of the abandonment of thousands of acres of mint soil in Michigan [*R.A.M.*, 31, p. 351], a brief discussion of the history of peppermint, its origin, and cultivation in the United States is followed by an account of the disease, under the headings name, history, economic importance, resistance and susceptibility, symptoms [ibid., 16, p. 491], etiology, and control. Field observations and greenhouse experiments showed that while occurring over a wide pH range, wilt develops least in alkaline soil. *Monarda fistulosa* was the only plant outside the genus *Mentha* found to be susceptible. No immune *Mentha* species are known. The varieties Mitcham, American, and White Mitcham of *M. piperita*, Scotch (Highland) and American (Common) of *M. spicata*, and *M. aquatica* and *M. citrata* were susceptible, whereas *M. sylvestris*, *M. arvensis* and its variety *piperascens*, *M. pulegium*, and *M. rubra* showed degrees of resistance.

Resistance to wilt in hybrids between *M. piperita* and *M. crispa* appears to be conditioned by two heterozygous, dominant factors in *M. crispa*, the resistant pollen parent. Several species hybrids were selected, the best of them being resistant under average seasonal conditions. Wilt-resistant spearmints were developed from *M. spicata* var. Scotch and *M. crispa*.

The fungus was found to survive in the soil for six or more years, even under rotation from which *M. piperita* was excluded; however, temporary control or improvement was obtained in some cases, maximum reduction in wilt occurring when mint was planted after sugar beets and potatoes. Avoidance of root injury by tilling implements and of loose seed beds also proved beneficial.

The author bases his new variety on the specific host range and optimum infection period in hot dry weather.

Janson (B. F.). **Fusarium root rot and wilt of Dill.**—*Phytopathology*, 42, 3, pp. 152–155, 1 fig., 1952.

This is an expanded account of the author's observations in Ohio on the root rot and wilt of dill (*Anethum* [*Peucedanum*] *graveolens*), caused by a new [unnamed] species of *Fusarium*, a preliminary note on which has already appeared [*R.A.M.*, 30, p. 431].

Disease survey in Natal Cane. Co-operation sought from Cane growers.—*S. Afr. Sug. J.*, 36, 3, pp. 143, 145, 3 figs., 1952.

In order to assist growers in notifying the South African Sugar Association Experiment Station of any occurrences of sugar-cane mosaic [virus] and smut [*Ustilago scitaminea*] in Natal [see above, p. 537], the symptoms of both diseases

are briefly described in popular terms. It is hoped with the co-operation of growers to obtain a true picture of the situation in regard to the two diseases, the only ones of any importance in the province at the moment.

De Urries (M. J.). **Pugillus fungorum Mauritanicorum a cl. P. Unamuno collect.** [A few Moroccan fungi collected by P. Unamuno.]—*An. Jard. bot. Madr.*, *1948–49*, 9, pp. 103–109, 1950. [Spanish. Received August, 1952.]

The following species of fungi have been collected in Spanish Morocco: *Dothidella oleandrina* on leaves of oleander at Castillejos, *Phomopsis vepris* on branches of *Rubus* sp. at El Biutz, *Uromyces striatus* [*R.A.M.*, 16, p. 207] on leaves of *Medicago hispida* [ibid., 20, p. 136] at Ceuta and of *M. turbinata* at Tetuán, and *U. trifolii* on *Trifolium* sp. at Castillejos.

De Urries (M. J.). **Notas micológicas.** [Mycological notes.]—*An. Inst. bot. A. J. Cavanilles* (formerly *An. Jard. bot. Madr.*), 2, 10 (memorial volume to Dr. A. Caballero), pp. 193–228, 12 figs., 1951 [published 1952].

The following new species are described in this list of fungi collected in Spain [*R.A.M.*, 29, p. 56]. *Colletotrichum acaciae* caused grey spots with brown margins on leaves of *Acacia cunninghami* in the Botanic Garden, Valencia. The oblong-ellipsoid conidia measure 13 to 18 by 3·5 to 4·5 μ, and the subhyaline, cylindrical conidiophores 8 to 20 by 4 μ. *Gloeosporium caballeroi* on stems of *Manihot palmata* in the Botanic Garden has oblong-cylindrical, hyaline conidia 13·5 to 16 by 4 to 4·5 μ and conidiophores 8 to 11 by 4 to 5 μ. *Phomopsis anonae* in the bark of *Annona cherimolia* branches at Valencia has pycnidia 300 to 1,000 μ in diameter with a papillate ostiole, and two types of conidia, one oblong-ellipsoid or oblong-fusiform, measuring 6·5 to 9·5 by 1·5 to 2·5 μ and the other filiform, hooked, and 20 to 30 by 1 to 1·5 μ. Occasionally there was a third type up to 13 μ long, tapering at one end and generally rather curved. The bacillate sporophores, straight or slightly curved, measured 8 to 14 by 2 μ.

Bausá Alcalde (Maria). **Algunos micromicetos recolectados por el Prof. Caballero Segares en Valencia.** [Some microfungi collected by Professor Caballero in Valencia.]—*An. Inst. bot. A. J. Cavanilles* (formerly *An. Jard. bot. Madr.*), 2, 10 (memorial volume to Dr. A. Caballero), pp. 229–255, 19 figs., 1951 [published 1952].

This further contribution to the fungi collected in the Botanic Garden, Valencia, by the late Dr. A. Caballero [see preceding abstract] includes seven new records for Spain and two new species. *Phomopsis asparagicola* n.sp. on stems of *Asparagus plumosus* is characterized by irregular pycnidia 250 to 560 μ in diameter by 115 to 140 μ long with a minutely papillate ostiole; ellipsoid or fusiform, biguttulate A-spores, 7 to 9·5 by 2 to 2·5 μ; hooked or flexuose, minutely guttulate B-conidia 18 to 25 by 1 μ; conical, guttulate A-sporophores 5·8 to 13·5 by 2 to 2·5 μ; and saccate or conical B-sporophores 7 to 9 by 2 to 2·5 μ. The newly erected genus *Alveophoma* differs from *Phoma* in having lobulate and often pluriostiolate pycnidia.

Sawada (K.). **Researches on fungi in the Tôhoku district of Japan (I). Erysiphaceae.**—*Bull. Govt For. Exp. Sta.* 50, pp. 97–140, 6 figs., 1951. [Japanese.]

The author gives an annotated list of Erysiphaceae recorded to date in Tôhoku, Japan, with Latin diagnoses of five new species as well as of ten other species described in 1949. Included among the latter are *Sphaerotheca spiraeae*, with globose perithecia measuring 75 to 88 μ in diameter; five to 13 hyaline or dark, prostrate appendages measuring 96 to 310 by 5 to 6 μ; asci 72 by 53 μ and ascospores 19 to

34 by 13 to 18 μ; on young branches and bases of the leaves of *Spiraea thunbergii* and *S. prunifolia* at Honshû. *Microsphaera magnoliae* n.sp. has perithecia 85 to 100 μ in diameter; the ascus is 44 to 67 by 4 to 47 μ, and the ascospores 15 to 20 by 11 to 14 μ; on leaves of *Magnolia obovata* in Honshû. *Microsphaera querci* n.sp. produces numerous perithecia on the upper surface of the leaves and few below; they measure 78 to 153 μ in diameter with six to 11 appendages; the asci with 6 to 8 ascospores are shortly stipitate at the base and measure 51 to 53 by 30 to 41 μ; the wall is 2·5 μ; the ascospores are 15 to 18 by 8 to 10 μ; on *Quercus serrata* at Honshû.

PARKER-RHODES (A. F.). **The basidiomycetes of Skokholm Island. VIII. Taxonomic distributions.**—*New Phytol.*, 51, 2, pp. 216–228, 1952.

The author deals with certain theoretical distributions of populations, which apparently have interesting applications to certain problems of taxonomy and ecology, and applies them to the data already collected on the larger basidiomycetes of Skokholm Island [*R.A.M.*, 30, p. 621]. The application of the theory supports the validity of the treatment in paper VII [loc. cit.], indicates that certain species are indigenous, and correctly predicts observed frequencies. For his purpose the author adumbrates a new grouping of Basidiomycetes.

BAXTER (J. W.) & CUMMINS (G. B.). **A monograph of species of Puccinia occurring on Salvia in North America.**—*Lloydia*, 14, 4, pp. 201–230, 26 figs., 1951 (published March, 1952).

This annotated list, with a key, is based mainly on specimens in the Arthur Herbarium, Purdue University Agricultural Experiment Station, Lafayette, Indiana, and includes descriptions of 19 species of *Puccinia* found on *Salvia* in North America, two of which, as well as one state and four varieties, are new. *P. caulicola* is the rust most commonly collected on sages in the United States, occurring chiefly on *S. lanceolata* but also on *S. greggii*. *P. impedita* is the only one present in the West Indies where it is widely distributed on various species including *S. coccinea*. *P. biporula* n.sp. occurs on *S. fulgens* in Mexico, *P. farinacea* on *S. farinacea* and *S. patens* in Mexico and Guatemala, and *P.f.* var. *azurea* n.var. on *S. azurea* in various parts of the United States.

HESSELTINE (C. W.). **A survey of the Mucorales.**—*Trans. N.Y. Acad. Sci.*, Ser. ii, 14, 5, pp. 210–214, 1952.

The history and taxonomy of the Mucorales are discussed on the basis of five contributions to the literature on the subject, including a thesis by the author entitled 'A revision of the Mucorales based especially upon a study of the representatives of this order in Wisconsin', 570 pp., University of Wisconsin, 1950.

DE JONG (P.). **The effect of seed dressings on the rate of germination of Tea seed.**—*Plant. Chron.*, 47, 7, pp. 177–181, 2 graphs, 1952.

During the winter of 1951 to 1952 a small scale trial of various fungicidal treatments on the germination of tea seed [*R.A.M.*, 30, p. 491] was carried out by the Scientific Department of the United Planters' Association of Southern India. The rapidity of germination after treatment with mercurial dressings (4 oz. to 82 lb. seed) was apparently dependent on the quantity of mercury used; thus, tillex (1·5 per cent. mercury) gave 62 per cent. germination after 28 days and agrosan GN (1 per cent. mercury) 50·6 per cent., compared with 43·3 per cent. for the untreated. Fernasan [ibid., 31, p. 247] was as efficient as the higher concentration mercurial in speeding up germination. Samples of seed in first-class condition with

no sign of germination showed a more marked response than those with fair proportion already sprouting.

Cuprosana dust for control of blister blight.—*Plant. Chron.*, 47, 7, pp. 181–184, 1952.

This information on the control of tea blister blight [*Exobasidium vexans*: *R.A.M.*, 31, pp. 461, 517] by the use of cuprosana dust is based on the experience gained in Ceylon in 1951 [loc. cit.]. To prevent bud infection of pruned tea four applications at four-day intervals of 6 per cent. dust at the rate of 5 lb. per acre are recommended, to be started within two or three weeks of pruning and followed by weekly applications of 5 lb. or slightly more until the crop is taken for manufacture. After plucking, dusting should be started immediately; a 2 per cent. dust may be preferable and an interval of at least four days should elapse between a dusting round and the next plucking.

Baumgart (R. W.). **A hibernaçao do mosaico do Fumo e os meios de contrôle dêste.** [The overwintering of Tobacco mosaic and the means of controlling the latter.] —*Rev. agron. Pôrto Alegre*, 15, pp. 106–108, 1951.

Contributions to the literature by J. Johnson [*R.A.M.*, 9, p. 207; 17, p. 274] and others form the basis of this general discussion on the overwintering of the tobacco mosaic virus [ibid., 26, p. 423], and cultural measures for the control of the disease, which is stated to be so prevalent in Pôrto Alegre, Brazil [cf. ibid., 18, p. 632; 24, p. 477; 26, p. 335], that a completely healthy tobacco stand is a rarity.

Prasad (N.) & Patel (I. M.). **Chitri disease of Tobacco in Gujarat.**—*Curr. Sci.*, 21, 1, p. 18, 1952.

The authors agree with Mathrani *et al.* (*Indian Tobacco*, 1, pp. 148–153, 1951) that the 'chitri' disease of tobacco in Gujarat, India, is not a typical wilt, but not with their conclusion that the associated species of *Fusarium* are secondary to the attack of a nematode resembling *Paratylenchus* [*Anguillulina*] *pratensis* [cf. *R.A.M.*, 28, p. 90]. From the results of studies covering three seasons the disease appears to be a complex of root rot due to *F. solani* f. *nicotianae* and wilt attributed to infection by *F. oxysporum* f. [var.] *nicotianae* [ibid., 30, pp. 201, 249]. The symptoms of both types are clearly discernible under both natural and artificial conditions.

Coolhaas (C.). **Large-scale use of F_1 hybrids in 'Vorstenlanden' Tobacco.**—*Euphytica*, 1, 1, pp. 3–9, 1952. [Dutch summary.]

This useful summary of the results of tobacco-breeding operations at the Vorstenlanden Experiment Station, Klaten, Java, with special reference to the period from 1925 to 1941, includes information on the development of resistance to *Phytophthora* [*parasitica* var. *nicotianae*: *R.A.M.*, 21, p. 226]. By means of individual selection in the F_2 and subsequent generations, after crossing a Timor strain with Vorstenlanden tobacco and repeated back-crossing with Vorstenlanden strains, resistance to the pathogen could be combined with superior Vorstenlanden quality. Further, the large-scale cultivation of F_1 hybrids of crosses between the resistant strain (known as TV) and Y_{10}, Chlorina, K.B.S., and EK, chosen for reasons of quality, resulted in the production of lines uniting *Phytophthora* resistance [ibid., 31, p. 212] with diversity of type.

Van Koot (Y.) & Camfferman (Miss J.). **Een ziekte bij Tomaat, veroorzaakt door een combinatie van Tomaten- en Komkommermozaeik (Nicotiana-virus 1+ Cucumis-virus 1).** [A Tomato disease caused by a combination of Tomato and Cucumber mosaics (*Nicotiana* virus 1+*Cucumis* virus 1).]—*Tijdschr. Pl Ziekt.*, 58, 1, pp. 14–20, 5 figs., 1952. [English summary.]

Symptoms of a virosis hitherto unknown in Holland were observed in the autumn

of 1950 on tomatoes in the glasshouse district of south Holland, the affected plants being of two types, (1) stunted and conspicuously bushy, with minute leaves, curling and turning colour at an advanced stage, and an almost entire absence of fruits; and (2) with a filiform (fern-leaf) leaf habit. The former condition was shown by inoculation tests and serological reactions to be caused by combined infection with tobacco mosaic and cucumber mosaic viruses [cf. *R.A.M.*, 31, p. 34], while the latter is attributed to cucumber mosaic virus alone [cf. ibid., 9, p. 417; 28, p. 647, *et passim*]. In the same houses were plants with tobacco mosaic alone. The introduction of the cucumber virus was evidently effected by aphids of *Macrosiphum euphorbiae*, to which the plants with the bushy and fern-leaf habits were exposed while out-of-doors in July and August. This hypothesis was strengthened by observations in three market-gardens, in one of which the plants were sprayed with parathion [ibid., 30, p. 250] to eliminate aphids. The percentages of cucumber mosaic virus and the virus complex developing among the treated plants were ±5 and less than 1, respectively, compared with ±40 and 10 to 15, respectively, in the two other gardens where the aphicide was not applied.

In two other nurseries the Victory and No. 10 van Pannevis varieties were sown under glass in mid-June. In one the plants were placed out-of-doors only a week before planting under glass: they contracted very little virus infection (±1 per cent. cucumber mosaic virus and 1 per cent. of the complex). In the second nursery Victory plants, left for a fortnight in an open storehouse before transference to the glasshouse, developed ±15 per cent. cucumber mosaic virus and 4 per cent. virus complex. Even heavier was the incidence of infection (±30 and 30 per cent., respectively) in the No. 10 van Pannevis plants, which were placed outside among aphid-infested cucumbers immediately on potting. In all these nurseries cucumber mosaic virus predominated over the complex, but in three others the position was reversed, the incidence of the complex being 30, 40, and 60 per cent., respectively, and of the former virus less than 1.

It is apparent from the foregoing that young tomato plants should be kept continuously under glass and treated at intervals with an aphicide. Chillis should be excluded from the vicinity. Where temporary maintenance in the open is unavoidable, the plants should not be placed near hosts of cucumber mosaic virus, the surrounding area should be kept free from susceptible weeds, and the plants should be sprayed regularly with parathion.

De Andrade (A. C.). **Fungicidas modernos para controlar a requeima do Tomateiro.** [Modern fungicides to control Tomato blight.]—*Biológico*, 18, 1, pp. 6–14, 4 graphs, 1952.

In five series of experiments with 15 fungicides for the control of tomato blight (*Phytophthora infestans*) [*R.A.M.*, 31, p. 520] in São Paulo, Brazil [see next abstract], where heavy losses were caused by the disease in the spring of 1950 and slighter reductions in the autumn of 1951, 1 per cent. Bordeaux mixture conferred the best protection on the leaves and fruits. It was, however, only slightly superior in this respect to dithane Z78 at 0·25 and phygon XL at 0·12 per cent., but the average yield following its use was 11 and 17 per cent. less than the two foregoing, respectively. Tennessee tribasic copper sulphate (0·3 per cent.) and salicylanilide (0·25 per cent.) were also effective in the elimination of the pathogen from the fruits.

De Andrade (A. C.). **A requeima do Tomateiro no Vale do Paraíba.** [Tomato blight in the Parahyba Valley.]—*Biológico*, 18, 2, p. 35, 1952.

Further spraying experiments against tomato blight [*Phytophthora infestans*] in São Paulo, Brazil [see preceding abstract], are in progress. The first outbreaks in

the Valley of Parahyba, where tomatoes are extensively cultivated, occurred in the spring of 1949 and were repeated in the following two years, though they were less severe in 1951. April and May seem to be the critical months for infection, so that crops planted in February are more liable to attack than those of June and onwards.

Keyworth (W. G.) & Dimond (A. E.). **Root injury as a factor in the assessment of chemotherapeutants for Fusarium wilt.**—Abs. in *Phytopathology*, 42, 2, p. 113, 1952.

A substantial reduction in the severity of the wilt resulting from inoculation of tomato plants with *Fusarium* [*bulbigenum* var.] *lycopersici* [cf. *R.A.M.*, 31, p. 393] was effected by (*a*) dipping the roots for 30 seconds in water heated to 55° C., (*b*) periodical root-pruning, and (*c*) application of sublethal doses of the chlorides of aluminium, calcium, iron, potassium, and sodium, sodium sulphate, potassium bromate, and hydrogen peroxide. The one common factor in the several treatments was root injury, to which, therefore, the disease reduction is evidently attributable, rather than to the action of any specific chemical. When the roots of plants treated with hydrogen peroxide and the controls were cut to $\frac{3}{8}$ in. long immediately before inoculation, the former still contracted only slight infection while the latter were severely wilted, suggesting that the mitigation was consequent on a change in host resistance and not merely an inhibition of the pathogen at the injured root surface. Some of the compounds selected by the tomato wilt chemotherapy test, e.g., n-octadecyltrimethylammonium pentachlorophenate (code No. HD3) [loc. cit.], cause considerable root damage, which must be taken into account in appraising the mode of action of the chemotherapeutants.

Hoadley (A. D.). **Inherited resistance to Colletotrichum phomoides in Tomato.**—Abs. in *Phytopathology*, 42, 2, p. 113, 1952.

Hereditary resistance to anthracnose (*Colletotrichum phomoides*) of a relatively high order occurs in some lines of the cherry tomato (*Lycopersicum esculentum* var. *cerasiforme*) [cf. *R.A.M.*, 30, p. 493]. Resistant, large-fruited lines have been developed through repeated back-crosses of resistant selections from crosses between the resistant cherry tomato and the susceptible Rutgers variety. Single-plant selections were made with detached fruit inoculated with a spore suspension of the pathogen, and the relative resistance of large-fruited lines was determined through replicated tests on naturally infected fruit. In one test the percentage of anthracnose averaged 32·5 for Rutgers, 7·8 to 16·3 for the resistant selections, and 0·5 for the cherry tomato. A 35-lb. basket accommodated 126 to 192 fruits of the resistant selections as compared with 123 of Rutgers. The nature of the inheritance appears to be complex.

Marsden (D. H.). **Pruning Elms affected with Dutch Elm disease.**—Abs. in *Phytopathology*, 42, 2, pp. 113–114, 1952.

In small-scale trials in 1950 at and near Amherst, Massachusetts, eight out of 12 elm trees naturally infected by *Ceratostomella ulmi* [*R.A.M.*, 29, p. 605] were apparently freed from the disease by prompt pruning out of all visibly affected parts. In 1951 twelve more trees were similarly pruned, of which seven displayed no further symptoms during the season. The treatment is unlikely to succeed with more than 5 per cent. wilting in the crown and discoloration of the sapwood extending into the trunk, so that early detection of the symptoms is essential.

Waller (S.). **The Wanstead fungus disease of Sycamore.**—*Essex Nat.*, 29, 1, pp. 9–13, 1952.

Most of the information given here on the [*Cryptostroma corticale*] disease of

sycamore trees in Essex has already been noticed from other sources [*R.A.M.*, 28, p. 602 and next abstract].

Gregory (P. H.). **The Sycamore sooty bark fungus (Cryptostroma corticale).**—*Essex Nat.*, 29, 1, pp. 13–16, 1 pl., 1 diag., 1952.

This description of *Cryptostroma corticale*, responsible for sycamore sooty bark disease [see preceding abstract] in south-west Essex, has already been noticed in a more detailed form from another source [*R.A.M.*, 31, p. 304].

Itô (K.) & Hosaka (Y.). **Gray mold and sclerotial disease of 'Sugi' (Cryptomeria japonica D. Don) seedlings, the causes of the so-called 'snow molding'.**—*Bull. For. exp. Sta., Tokyo*, 51, pp. 1–27, 4 pl., 8 figs., 1951. [Japanese, with English summary.]

Investigations at the Laboratory of Forest Pathology, Government Forest Experiment Station, Tokyo, showed that damage sustained in northern Japan by *Cryptomeria japonica* seedlings under snow is due to *Botrytis cinerea* and *Sclerotinia kitajimana* n.sp., the former, more virulent organism also affecting seedlings under heavy mulch in snow-free areas in winter.

S. kitajimana n.sp. has apothecia 1·5 to 2 mm. wide, the stipe 2 to 3 mm. long; with cylindrical or clavate-cylindrical asci, 84 to 122 by 6 to 9 μ; monostichous, ellipsoidal or ovoid, hyaline ascospores, 7 to 9 by 3·5 to 4·5 μ; and filiform, simple, non-septate paraphyses, 105 to 130 by 2·5 to 3 μ. The globose or depressed globose sclerotia measure 1·5 to 4 by 1 to 2 mm. Mycelial growth occurs at temperatures between 7° and 31° C., the optimum being 20°. Numerous micro- but no macroconidia developed on the mycelial colonies; the microconidia did not germinate in various nutrient solutions. Sclerotia formed on agar media, often in rings, between 7° and 25°, optimum production occurring at 20°.

No genetic relationship was established between the two fungi. Inoculation tests with both showed *Larix kaempferi*, *Pinus densiflora*, and *C. japonica* to be very susceptible and *Chamaecyparis obtusa* very resistant.

Gravatt (G. F.) & Manganaro (Mrs. S. G.). **List of translations pertaining to forest pathology.**—79 pp., U.S.D.A., Division of Forest Pathology, Beltsville, Maryland, 1949. [Mimeographed. Received June, 1952.]

This is a list, arranged alphabetically under authors, of the titles of over 800 papers on forest pathology, which have been translated into English, reviewed, and edited at the Division of Forest Pathology, Beltsville, Maryland. Copies of most of the translations are available at the Library of the United States Department of Agriculture. Supplemental lists are to be issued. Translations of relevant papers not included in the list will be welcomed at the Division of Forest Pathology.

Nylinder (P.). **Om patologiska hartskanaler.** [On pathological resin canals.]—*Medd. SkogsforsknInst. Stockh.*, 40 (*1951*), 7, pp. 1–12, 8 figs., 1952. [English summary.]

Damage to the trunks of various conifers grown in Sweden may be followed by the formation of pathological resin canals, which extend further downwards than upwards. If the injury occurs during the growing period the canals are formed immediately; if at some other time, and the resin flow coincides with the resumption of growth, they develop at the beginning of the spring wood. In spruce the pathological resin canals are often twice as large as the normal ducts, while in pine both are approximately the same size. The number of pathological resin canals in spruce is frequently several times larger than that of the normal ducts. The number falls abruptly in a tangential direction from the point of injury; longitudinally the decline

is slower. In certain cases the canals may be traced far down into the roots. In spruce the number of normal resin ducts is sharply reduced in the annual growth rings immediately following the growth ring containing the pathological resin canals. The cells formed at the same time as the pathological resin canals or just after them have thinner walls and are larger than those formed immediately before them. A study of the pathological resin ducts facilitates the determination of the time during the growing period when the damage occurred.

Oppermann (A.). **Das antibiotische Verhalten einiger holzzersetzender Basidiomyceten zueinander und zu Bakterien.** [The antibiotic relation of some wood-destroying basidiomycetes to one another and to bacteria.]—*Arch. Mikrobiol.*, 16, 4, pp. 364–409, 11 figs., 1 diag., 11 graphs, 1951.

At the Institute of Plant Physiology, University of Göttingen, Germany, 22 wood-destroying basidiomycetes and one ascomycete were grown in pairs on malt agar plates, and in some cases also on wood blocks. Each was also grown in the nutrient culture solution of every other. In 67 per cent. of the cultures the approach of one mycelium to another was accompanied by inhibition of growth even before contact was effected; in 22 per cent. growth did not cease until the hyphae met; in 6 per cent. one fungus overran the other without cessation of growth; and in 5 per cent. the mycelia merged in a zone sparsely populated by hyphae. The slowly growing *Polyporus giganteus*, *Merulius lacrymans*, and *Armillaria mellea* exerted a powerful antagonistic action, repelling at a considerable distance the advance of nearly all the other species tested. At the other extreme were the rapidly developing *Fomes igniarius*, *Panus conchatus*, *Polystictus versicolor*, *Polyporus applanatus* [*Ganoderma applanatum*], *Favolus europaeus*, and *Schizophyllum commune*, which exerted little or no adverse effect on the growth of the rest. Intermediate both in growth rate and antagonistic influence were *P. squamosus*, *Daedalea unicolor*, *Lepiota cepaestipes*, *P. sulphureus*, *D. quercina*, *Pholiota squarrosa*, *P. mutabilis*, *P. spectabilis*, *Xylaria polymorpha*, and others. Studies were also made of the suppression of the hyphae and pH changes in the inhibition zone, and of the inhibiting substances produced by *A. mellea* against *S. commune*.

Some species, e.g., *A. mellea*, *Polyporus giganteus*, *M. lacrymans*, *D. quercina*, and *D. unicolor* produced antibiotic substances which were active against various bacteria, mostly of the Gram-positive group [cf. above, p. 569], including *Pseudomonas* [*Bacterium*] *tumefaciens*. Detailed results are given of some of these reactions. *A. mellea* appeared to have a fairly strong inhibitory effect on *B. tumefaciens* (inhibition zone of 2 mm.), its culture filtrate giving a wider (2·5 mm.) but less clearly marked zone, while *S. commune* filtrate gave a 6 mm. clear zone and *X. polymorpha* a 3 mm. one. *D. quercina*, *D. unicolor*, and *M. lacrymans* cultures and *P. sulphureus* and *Dermocybe* sp. filtrates also showed some inhibitory effect on the crown gall organism.

Silverborg (S. B.). **Wood decay in houses.**—*Bull. N.Y. St. Coll. For.*, 24, 1, 19+ 2 pp., 30 figs., 1951.

This is a succinct account in popular terms of the predisposing causes, prevention, control, and repair of [unspecified] fungal decay in house timbers inside and out [cf. *R.A.M.*, 16, pp. 3, 508; 25, pp. 20, 194, 195; 31, p. 1, *et passim*]. The relative resistance to decay of the heartwood of various native American woods is listed and there are two brief sections on wood preservatives and their application.

Zycha (H.). **Die Bewertung pilzhemmender Eigenschaften von Grundieranstrichen.** [The evaluation of the fungistatic properties of priming coats of paint.]—*Holz a. Roh.-u. Werkst.*, 10, pp. 41–43, 6 figs., 1952.

The incorporation of a fungicide in priming coats of paint is aimed primarily at

the prevention of damage by [unspecified] blueing fungi, but protection against wood-destroying species, such as *Coniophora cerebella* [*C. puteana*], *Lentinus squamosus* [*L. lepideus*], *Lenzites abietina*, and *Merulius* [*lacrymans*] is often sought at the same time. Indications as to the protective efficiency of a given preparation may be obtained by exposing the untreated side of coated samples to fungal invasion. In experiments at the Institute of Applied Mycology and Wood Preservation, Hann.-Münden, Germany, two commercial preparations did not penetrate below the surface (1 to 2 mm.), whereas the admixture of a fresh solution of 4 or 5 per cent. pentachlorophenol [*R.A.M.*, 31, p. 396] with one-third linseed oil and two-thirds test benzene resulted in the formation of a protective layer of 4 and 4 to 5 mm., respectively. Reasonably good protection was also conferred in preliminary wood-block tests by 5 and 10 per cent. zinc silicofluoride [ibid., 31, p. 525].

Sorsa (B.). **Eräiden lahosuoja-aineiden vaikutuksesta liimauksiin.** [The effect of some wood preservatives on gluing.]—*Paperi ja Puu*, 34, 2, pp. 28–30, 2 diags., 1952. [English summary.]

At the State Institute for Technical Research, Helsinki, Finland, the effect of the water-soluble preservatives, Wollman and Boliden [*R.A.M.*, 29, p. 546] salts, lahotuho-K 33, and ilman lahosuoj, on the setting of resin glues at room temperature was investigated on wood blocks. When the gluing was carried out before impregnation no weakening of the joints ensued, but when the preservative was applied first only resorcinol and phenolic glues made firm joints, urea being unsatisfactory, especially after immersion in water.

Noll (Luise). **Schädlingsbekämpfung im Gemüsebau.** [Pest control in market-gardening.]—*Dtsch. Landw., Berl.*, 2, 12, pp. 661–664, 4 figs., 1951.

Besides the various propagation and damping-off fungi, such as species of *Fusarium* and *Pythium*, *Moniliopsis* [*aderholdi*: *R.A.M.*, 17, p. 183], and *Thielavia* [*Thielaviopsis basicola*: ibid., 22, p. 161], which are more or less prevalent on all vegetables in Germany, and may be combated by the timely application to the frame or seed-bed of a 0·05 per cent. ceresan or germisan solution, the pathogens of special crops require individual treatment. For instance, anthracnose of beans [*Phaseolus vulgaris*], caused by *Colletotrichum lindemuthianum* [ibid., 14, p. 670], and of peas (*Ascochyta pisi*, *A. pinodella*, and *Mycosphaerella pinodes* [ibid., 19, p. 510; 30, p. 501, and below, p. 587]), which have been greatly on the increase of late years, are amenable to spraying with 1 per cent. cupral when the plants are in the cotyledonary stage; later treatments are inadmissible on hygienic grounds. The same preparation is also effective against *Corynespora melonis* [*C. cassiicola*] on cucumber, melon, and vegetable marrow, *Colletotrichum lagenarium* on cucumber [ibid., 29, p. 346], and *Septoria lycopersici* [ibid., 7, p. 681], *Alternaria solani* [ibid., 25, p. 478], and *Phytophthora infestans* on tomato [ibid., 15, pp. 405, 539]. Recent experience further indicates that the last-named, especially in bush tomatoes, yields to the very simple method of one or two applications of 0·05 per cent. germisan. Like the copper sprays, however, this treatment must be discontinued when the fruit begins to ripen.

Mahmud (K. A.). **Damping-off of Brassica juncea Coss. caused by Pythium aphanidermatum (Eds.) Fitz.**—*Sci. & Cult.*, 16, 5, pp. 208–209, 1952.

A damping-off of Chinese mustard (*Brassica juncea*) occurred [near Nagpur, India], in October, 1948, *Pythium aphanidermatum* [cf. *R.A.M.*, 30, pp. 399, 446; 31, p. 526], not previously recorded on this host, being isolated from affected material. When the pathogenicity of the fungus was tested in autoclaved soil in

pots, 11 per cent. of the seedlings died from damping-off within two weeks of germination. The organism was reisolated from the affected seedlings.

Cook (A. A.), Walker (J. C.), & Larson (R. H.). **Studies on the disease cycle of black rot of crucifers.**—*Phytopathology*, 42, 3, pp. 162–167, 2 figs., 1952.

The results of studies at the University of Wisconsin, Madison, indicated that in nature stomata are unimportant in relation to penetration by *Xanthomonas campestris*, the agent of black rot of crucifers [*R.A.M.*, 30, p. 255; 31, p. 417], since its entrance into the host depends on a continuous path of liquid in the stomatal aperture and the substomatal chamber. Subjection of the roots of young Jersey Queen cabbage and Early Snowball cauliflower plants to relatively high artificial water pressure before atomizing the leaves with a bacterial suspension resulted in water congestion [ibid., 28, p. 25], and subsequent infection through the stomata on the lower leaf surfaces.

Although mechanical injury to the roots of cabbage seedlings was shown not to be essential for infection through the underground system, a much higher percentage was obtained on roots clipped with shears than on intact ones. Thus, of 100 plants inoculated through uninjured roots, 13 developed symptoms and seven died in the course of the tests, the corresponding figures for 60 inoculated through clipped roots being 44 and 15, respectively, the leaves of the latter group bearing about three times as many lesions as those with intact roots.

The development of black rot in mildly affected cabbage plants, six to eight weeks old at inoculation, was observed at 16°, 20°, 24°, and 28° C. The expression of two symptom types conformed to a definite pattern. For the first 19 days after inoculation characteristic marginal lesions predominated in the higher ranges. Thenceforth until 35 days after inoculation there was a rapid transition in symptom type, culminating in the marked predominance of systemic lesions originating in more central areas of the leaves. At the lowest temperature the lesions were almost exclusively marginal. A third symptom type, a chlorotic spotting, often appeared shortly after inoculation and was attributed to the diffusion of a toxin through the tissues in advance of the pathogen. The examination of tissue transfers from leaves with marginal lesions demonstrated that the latter, as well as those in the central areas of the leaf blade, proceeded from systemic infection [ibid., 29, p. 393] rather than from invasion of the hydathodes.

Dorn (Martha). **Untersuchungen über eine Blattschwärze der Zuckerrübe.** [Studies on a blackening of Sugar Beet leaves.]—*Phytopath. Z.*, 17, 1, pp. 85–110, 12 figs., 1 diag., 3 graphs, 1950. [Received April, 1952.]

A necrosis of sugar beet leaves, for which the name of 'beet leaf blackening' is proposed, has been observed annually since 1946 in the breeding plots of the firm of Rabbethge and Giesecke at Einbeck (formerly Klein-Wanzleben), Germany. The symptoms, confined to leaves in the second and third rolls of the rosette of older plants, consist of a uniform black discoloration of the distal half of the leaf, covered with a green-shimmering, velvety coating and sharply divided from the healthy part by a yellowish-brown stripe, 2 to 3 mm. in diameter, comprising successive barricades. Here and there circular, brown to grey spots, up to 0·7 cm. in diameter, appear on the blackened area. The necrosis starts at the beginning of August from the leaf tip or margin and continues to spread until the end of September, sometimes extending farther along the midrib.

The fungus isolated from the diseased tissues was identified as *Alternaria tenuis* [*R.A.M.*, 17, p. 220; 22, p. 123]. The 216 monospore cultures proceeding from the isolations could be placed in five groups, clearly differentiable by their mycelial characters and designated as 'strains' A to E. The mean conidial dimensions (100

measurements) of strains A to D were 18·1±1·3 by 10·2±0·6 μ, which differ from those given by Neergaard [ibid., 25, p. 579]. The pigment diffusing from strains A and D into the cherry juice agar medium was green, that from B and C purple and brown, respectively, while E (the most aggressive in inoculation experiments) cultures were colourless. On maize agar the pigmentation was more vivid, but the other media used did not react. Only within the optimum temperature range for mycelial growth, 25° and 30° C. [loc. cit.], were there any differences in the growth rates of strains A to D, B developing most rapidly, followed by A, D, and C in that order. The minimum and maximum temperatures for growth were 3° and 35°, respectively. Differences in light intensity did not affect the growth of the cultures. At 25° the growth rate of strains A, B, and D gradually decreased between 100 and 84·5 per cent. relative air humidity, while at 83 per cent. development ceased after four days. Strain C continued to grow at a uniform rate between 100 and 84·5 per cent., but its development also was arrested at 83 per cent. None of the strains sporulated at 84·5 per cent. At 10° the mycelium of C covered the entire agar surface at 79·4 per cent. relative humidity, whereas A, B, and D extended over only a quarter. The four strains grew best within a pH range of 4·8 to 5·5, with a second, less well-defined optimum for C at 7·5. Purple sectors developed extensively but quite irregularly in cultures of A and D (which in general present many close analogies) on cherry, maize, and SA (containing dextrose, asparagine, and salts) [loc. cit.] agars.

The pathogen proved unable to attack leaves in a state of full physiological activity. Normally nourished plants contracted very little infection at the age of four to five months, but at seven months inoculation was uniformly successful (in an extremely humid atmosphere only), though blackening did not invariably develop and was apparently associated with dense populations of *Myzodes* [*Myzus*] *persicae*. Phosphorus and magnesium deficiencies materially increased susceptibility to *A. tenuis*, the latter element being particularly important in this respect; its absence resulted in the development of infection in three-month-old plants.

The possibility that infection by *Cercospora* [*beticola*: ibid., 17, p. 220] or *Phoma* [*betae*] might pave the way for subsequent invasion by *A. tenuis* was investigated with negative results.

It was realized at an advanced stage of the investigations that at Einbeck leaf blackening occurs extensively, even in young plants with five or six leaves, among certain inbred lines. Deficiency experiments revealed disturbances, evidently of genetic origin, in the magnesium and phosphorus metabolism of the selections. In inoculation tests, strain E caused 83 per cent. infection in these lines, compared with an average of 60 per cent. for the other strains.

Steudel (W.). **Verbreitung und Epidemiologie der Vergilbungskrankheit und heutiger Stand der Bekämpfung.** [Distribution and epidemiology of yellows disease and the present control position.]—*Zucker*, 4, 9, pp. 181–184, 1952.

Information is given on the distribution, epidemiology, and control of virus yellows of beet, with special reference to West German conditions [see above, pp. 535, 536 and next abstract], in this paper read at a meeting of the Sugar Industry Association at Bonn on 24th February, 1951.

Steudel (W.) & Heiling (A.). **Der Einfluss der Saatzeit auf Auftreten und Ausbreitung der Vergilbungskrankheit der Beta-Rüben.** [The influence of sowing time on the occurrence and spread of the Beet yellows disease.]—*NachrBl. dtsch. PflSchDienst, Stuttgart*, 4, 3, pp. 40–44, 2 graphs, 1952.

Further evidence is presented from the authors' continued experiments in western Germany [see preceding abstract] in support of observations from various

quarters that late sowing, in seasons of heavy aphid invasion, favours the development of beet virus yellows in areas of average infestation [*R.A.M.*, 26, p. 39; 30, p. 399; 31, p. 217]. In 1951, when the disease was much more prevalent than in 1950, the incidence of infection in plots sown on 19th and 24th April and 9th and 19th May rose progressively, coinciding with proportionate increases in the populations of *Myzodes* [*Myzus*] *persicae* and *Doralis* [*Aphis*] *fabae*. The percentage of virus yellows may be reduced, therefore, by early sowing and using sufficient quantities of seed to produce a complete stand (70,000 to 80,000 per ha.).

Quantz (L.). **Die wichtigsten Viruskrankheiten der heimischen Leguminosen.** [The most important virus diseases of indigenous Leguminosae.]—*Saatgut-Wirtsch.*, *1952*, 2, pp. 34–37, 6 figs., 1952.

Essential information is presented on the symptomatology, etiology, host range, transmissibility, and control of a number of legume viroses, some of which are known to occur in Germany, while the others are of potential importance. To the former group belong bean mosaic [*R.A.M.*, 18, p. 197], bean yellow mosaic [ibid., 31, p. 370], and tobacco ring spot [ibid., 18, p. 811] viruses on bean (*Phaseolus vulgaris*) [see above, p. 535], pea mosaic virus on pea and broad bean [ibid., 30, p. 300], pea enation mosaic virus on pea [ibid., 31, p. 312], cucumber mosaic virus [ibid., 18, pp. 509, 803] and a form of bean yellow mosaic virus on lupin, soy-bean mosaic virus on soy-bean [ibid., 20, p. 444], miscellaneous viruses on clover, including those of pea and bean mosaic [ibid., 25, p. 454], and lucerne mosaic virus [loc. cit.].

Schrödter (H.). **Über die Bedeutung des Mikroklimas für die Entwicklung parasitischer Pilze der Gattung Ascochyta (Erreger der Brennfleckenkrankheit der Erbse).** [On the importance of the microclimate in the development of parasitic fungi of the genus *Ascochyta* (agents of Pea anthracnose).]—*Angew. Meteorol.*, 1, 3, pp. 79–85, 4 graphs, 1951.

The results of studies at the Aschersleben [Saxony] branch of the Biological Institute on the influence of the microclimate on spore discharge and germination in *Ascochyta pinodella*, an agent of anthracnose of peas [see above, p. 584], showed that both processes depend primarily on moisture, especially on wetting by dew, mist, or rain. Germination in particular requires a minimum of 15 to 20 hours' high humidity. Temperature is less important, germination occurring to a moderate extent throughout the range from 6° to 24° C. and in abundance from 8° to 22°. The rarity of severe outbreaks of anthracnose in the dry climate of central Germany is no doubt attributable to the exacting moisture requirements of *A. pinodella*, a disadvantage of which, from the plant-breeder's standpoint, is the virtual impracticability of field trials for varietal resistance [*R.A.M.*, 30, p. 596]. On the other hand, microclimatic conditions formed a useful basis during the period from 1947 to 1949 for the prognosis, by means of a climagram, made by plotting spore-germination against temperature and hours with over 90 per cent. humidity, of the natural development of anthracnose lesions.

Seed treatments and inoculation for Soybeans.—*Soybean Dig.*, 12, 5, pp. 14–16, 2 figs., 1952.

Laboratory and field experiments were performed by the Research Department, the Nitragen Co., Inc., in Wisconsin to determine the effect of seed treatment with arasan, phygon, and spergon [*R.A.M.*, 31, p. 220] on the nodule bacteria (*Rhizobium* spp.) of Lincoln and Hawkeye soy-bean. It was found that, although the fungicides exert an adverse effect on nodulation, treated seed may be inoculated successfully if reasonable precautions are observed. These include inoculation

immediately before planting, preferably by the 'wet' method; maintenance of a sufficiently high soil moisture content; and use of increased dosages of the inoculant to offset the injury to the bacteria caused by the treatments.

Karel (G.). **Baklakarda Botrytis leke hastaliği.** [Broad Bean spot disease caused by *Botrytis*.]—*Bit. Kor. Bült., 1952*, 2, pp. 16–22, 2 figs., 1 diag., 1 graph, 1952. [German summary.]

Observations over a period of years in the Mediterranean provinces of Turkey have shown that *Botrytis fabae* may cause reductions in the broad bean crop [*R.A.M.*, 27, p. 349] of 60 to 100 per cent. In the vicinity of Adana, too, the disease occurs in both a mild and an 'aggressive' form. The dimensions of the conidia are somewhat smaller than those given by Sardiña [ibid., 9, p. 424], ranging from 10·7 to 23·4 by 9·8 to 16·4 (average of 100, 16·09 by 13·24) μ, while the sclerotia are larger (1 to 16 mm. in diameter).

Mahmud (K. A.). **A preliminary report on loop-top of Garlic.**—*Sci. & Cult.*, 17, p. 296, 1 fig., 1952.

In December, 1950, 80 per cent. of the garlic seedlings in a garden at Nagpur, India, became affected by a hitherto unrecorded disease. When the second or third leaf appeared, it failed to open at the top, and the tip of the succeeding leaf remained caught in the unopened tip. Successive leaves behaved similarly, the process resulting in a series of connected loops. The tangled leaves yellowed from the tip downwards and dried. The bulbs and roots of affected plants were poorly developed. No organism was isolated from affected material and attempted graft transmissions were unsuccessful. Further work is to be undertaken.

Jain (A. C.). **Pythium leaf-rot of Lettuce.**—*Sci. & Cult.*, 17, 5, p. 258, 1951.

In October, 1949, lettuces at Nagpur, India, developed leaf rot and *Pythium aphanidermatum* [see above, p. 584] was isolated from affected material. Leaves touching the ground were the most severely affected. Minute, watersoaked spots appeared and rapidly enlarged (under favourable conditions), involving the entire leaf. Artificial inoculations [on lettuce] proved that the fungus, which was reisolated in all cases, was pathogenic.

Van der Kloes (L. J. J.). **Het randen van Sla.** [Tipburn of Lettuce.]—Reprinted from *Meded. Dir. Tuinb.*, 15, 3, 15 pp., 4 figs., 3 graphs, 1952. [English summary.]

From observations in the glasshouses of south Holland, supplemented by a study of contributions to the literature on tipburn of lettuce, the disorder appears to be promoted by a number of factors all contributing to low absorption of water and rapid evaporation and transpiration [cf. *R.A.M.*, 25, p. 535]. In M[artha] Bakker's comparative tests (*Kwartaalversl. Tuinbouwk. Onderz., 1949*, 2, p. 5; 3, pp. 8–9, 1949), the Blanke Meikoningin variety was more susceptible than the commonly cultivated Meikoningin, while Resistant Early French Frame and Blackpool, introduced from England, showed a much higher degree of resistance. No varieties completely resistant are known.

Ellis (E. A.). **Miscellaneous observations. Lettuce rust.**—*Trans. Norfolk Norw. Nat. Soc.*, 17 (*1951*), 3, p. 220, 1952.

Inoculation experiments showed that *Puccinia opizii* [*R.A.M.*, 30, p. 504] produces uredo- and teleutospores on the tussock sedges, *Carex paniculata* and *C.*

appropinquata at Wheatfen Broad, Surlingham, Norfolk. Aecidia were produced on the wild lettuce (*Lactuca virosa*) as well as on several varieties of garden lettuce.

PLAKIDAS (A. G.). **White rust of Spinach in Louisiana.**—*Plant Dis. Reptr*, 36, 5, p. 211, 1952. [Multilithed.]

White rust (*Albugo* [*Cystopus*] *occidentalis*) [*R.A.M.*, 21, p. 128] was widespread and severe in a planting of several acres of spinach near Natchitoches, Louisiana, in April, 1952. This appears to be the first occurrence of the disease in Louisiana.

HEY (G. L.). **Recent developments in disease control.**—*M.G.A. Bull., 1952*, 27, p. 79, 1 fig., 1952.

In recent tests for the control of mushroom diseases spraying with a zineb preparation (1 lb. per 100 gals. water at the rate of 1 gal. diluted spray per 100 sq. ft. of bed) was found to be effective against bubble (*Mycogone*) [*perniciosa*: *R.A.M.*, 31, p. 531], *Verticillium* [spp.: loc. cit.], and *Geotrichum* [spp.: ibid., 30, p. 11], while the application of 8 to 12 oz. of a 15 per cent. zineb dust per 1,000 sq. ft. of bed gave a better control of *Dactylium* [spp.: ibid., 31, p. 531]. Wettable powders based on zineb for spraying and dusting are now available commercially in Great Britain. Three spray or dust applications each made before watering, the first soon after casing, the second between the first and second breaks, and the third between the second and third breaks, are recommended. This new fungicide may also reduce the incidence of bacterial spot [loc. cit.].

JAIN (A. C.) & NEMA (K. G.). **Aspergillus blight of Ground-nut seedlings.**—*Sci. & Cult.*, 17, pp. 348–349, 1952.

In July, 1950, groundnut seedlings, one- to two-weeks old, at Nagpur became affected by a disease not previously recorded from India. Infected material invariably contained *Aspergillus niger* [cf. *R.A.M.*, 31, p. 47]. A circular, brownish spot appeared on the cotyledon; the discoloured area rapidly rotted, and the rot spread to the stem and hypocotyl. The affected stems became shredded. In favourable conditions the fungus also caused pre-emergence rotting of seeds and seedlings. In pathogenicity tests with surface-sterilized seeds in autoclaved soil in pots all the seeds with spore inoculum placed under the broken testa produced plants with characteristic symptoms, the pathogen being reisolated in every instance.

LUTTRELL (E. S.) & WEIMER (J. L.). **Macrophomina stem canker and ashy stem blight of Cowpea.**—*Plant Dis. Reptr*, 36, 5, pp. 194–195, 2 figs., 1952. [Multilithed.]

An outbreak of cowpea stem canker (*Macrophomina phaseoli*) [*R.A.M.*, 24, p. 302] was again observed at the Georgia Experiment Station in September, 1946. Six Weeks Ala, Speckled Crowder, Brabham, Cream Crowder Short Pod, Groit, Alalong Browneye, Victor, and Sugar Crowder were all found to be highly resistant, but the degree of infection was apparently correlated with maturity data, the varieties classed as susceptible and resistant producing mature pods in 50 to 67 and 60 to 95 days, respectively.

FRÉIRE (J. R. J.). **Consideraçoes sôbre o problema da bacteriose da Mandioca.** [Considerations on the problem of Cassava bacteriosis.]—*Rev. agron. Pôrto Alegre*, 15, pp. 103–104, 1951.

The control of cassava bacteriosis (*Xanthomonas manihoti*) [*R.A.M.*, 28, p. 326; 31, p. 419] in the State of Pôrto Alegre, Brazil, presents great difficulties. A long

campaign of intensive propaganda would be necessary to instruct local growers in the practice of such cultural measures as the selection of healthy planting material, change of planting sites, roguing of diseased plants, and provision of optimal environmental conditions; the development of resistant varieties [loc. cit.] appears to be the most hopeful line of approach to the problem.

HEWITT (W. B.). **Some responses of Grapevines to sodium arsenite spray applied for black measles control.**—*Phytopathology*, 42, 3, pp. 158–161, 2 graphs, 1952.

In a Californian vineyard the author compared two methods of treating vines with sodium arsenite for black measles control [*R.A.M.*, 28, p. 376], namely, (*a*) spot-treating, involving swabbing during the dormant season of the trunks and arms of diseased vines only, and (*b*) spraying all the vines in a plot. The former procedure failed to reduce the incidence of the disease, whereas the latter diminished it by over 50 per cent.

Dormant sprays of sodium arsenite at concentrations (expressed as lb. of arsenious oxide per 100 gals.) of 1·5, 2·5, and 3·5 significantly reduced the number of diseased vines as compared with those in the untreated plots. The difference between any two of the three sprays was not significant, but the totals of the three replications in each treatment showed a decrease of 47, 58, and 64 per cent. in diseased vines with each increase in arsenite concentration. In the unsprayed plots the incidence of measles increased by 22 per cent. New cases increased 18·5 per cent. in the untreated plots as against 8, 7·1, and 6·7 per cent., respectively, in those sprayed with the three concentrations.

In the seasons of 1943 and 1944, 2,835 Thompson Seedless vines were grouped in healthy and five symptom classes in order of severity before and after spraying with sodium arsenite at the above-mentioned concentrations. The disease shifted irregularly from one symptom class to another in both the sprayed and unsprayed plots, the movement being greater from diseased to healthy in the former and vice versa in the latter. Better results were obtained from spraying entire vines than from unilateral treatment, and application after pruning was more successful than when carried out before. Two consecutive annual sprays of sodium arsenite reduced the yield of 120 Gamay vines by 23 per cent. after the second treatment, but Muscat Canelli and Thompson Seedless did not suffer even after three successive applications.

VUITTENEZ (A.). **Transmission par double greffage d'une panachure infectieuse de la Vigne.** [Transmission by double grafting of an infectious mottling of the Vine.]—*C.R. Acad. Sci., Paris*, 234, 10, pp. 1084–1086, 1952.

Vines in Alsace, France, are stated to be suffering from a disease characterized, especially in early June, by a very conspicuous golden-yellow mottling of the leaves and leading to progressive deterioration of vigour and yield [see next abstract], the Traminer variety being particularly susceptible. The habitual occurrence of the diseased stocks in more or less extensive patches, radiating progressively outwards, suggested the implication of a virus, and this hypothesis was confirmed by the transmission of infection by means of double grafting.

VUITTENEZ (A.). **Sur la présence de cordons endovasculaires chez les Vignes atteintes de panachure, et leur apparition dans des boutures inoculées par greffage.** [On the presence of endovascular cordons in Vines attacked by mottling and their appearance in slips inoculated by grafting.]—*C.R. Acad. Sci., Paris*, 234, 11, pp. 1205–1207, 1952.

The anatomical examination of vine shoots grafted on stocks affected by the

mottling disease already described [in Alsace: see preceding abstract] revealed endocellular cordons of the kind associated with court-noué [*R.A.M.*, 31, p. 172]. They were most abundant in the vessels but occurred also in the xylem fibres and cells, cambium, phloem parenchyma, and sieve-tubes. In those experiments in which diseased material was grafted simultaneously on a vinifera variety (Gewürztraminer) and the hybrid Riparia-Berlandieri (Kober 5 BB), cordon formation was invariably much more extensive in the latter than in the former. The presence of the cordons could be demonstrated before the appearance of any external symptoms of the disease.

Blumer (S.) & Kundert (J.). **Die Peronospora der Rebe und ihre Bekämpfung im Jahre 1951.** [*Peronospora* of the Vine and its control in the year 1951.]—*Schweiz. Z. Obst-u. Weinb.*, 61, 4, pp. 57–63, 2 figs., 1 graph, 1952.

Weather conditions in the Zürich district of Switzerland in 1951 were conducive to cumulative infection by *Peronospora* [*Plasmopara viticola*: *R.A.M.*, 31, p. 532] on vine leaves and first buds at the end of June, and the slight rainfall of early July sufficed to produce an outbreak of downy mildew. The most effective of nine fungicides tested for the control of the disease, using a schedule of three pre- and four post-blossom treatments, was an unnamed organic preparation, applied at 0·25 per cent. for the former and 0·5 for the latter, which reduced the incidence of berry infection from 100 to 1·9 per cent. Thiocarbamate at 0·3 per cent. (for the pre-blossom treatments only, 1·5 per cent. Bordeaux mixture being applied for the later ones) was next with 19·7 per cent. infection, and copper-thiocarbamate at 0·5 per cent. on the same basis, with 21·5 per cent. The ordinarily efficient Bordeaux mixture (1 and 1·5 per cent. for pre- and post-blossom treatments, respectively) permitted the development of 33·1 per cent. infection (or 41·6 if the concentration for the later applications was reduced to 1).

Müller-Stoll (W. R.). **Versuche zum Problem der Wirksamkeit von Seifen- und Siefenersatzmitteln gegen den Traubenschimmel (Botrytis cinerea).** [Experiments on the problem of the efficacy of soaps and soap substitutes against the Grape mould (*Botrytis cinerea*).]—*Phytopath. Z.*, 17, 3, pp. 265–286, 5 figs., 1950. [Received April, 1952.]

This fully tabulated account and discussion of laboratory experiments in two German scientific institutes to determine the efficacy of soaps and soap substitutes, either alone or as adjuvants to fungicides, in the control of the grape rot caused by *Botrytis cinerea* [*R.A.M.*, 3, p. 531], was concluded in 1939, but its publication was unavoidably delayed. Neither ordinary vineyard soft soap nor any of the substitutes tested exerted a specific fungicidal action, and such fungistatic properties as they possessed were totally inadequate for practical purposes [ibid., 25, p. 491]. *B. cinerea* is markedly insensitive to metallic poisons, such as copper and arsenic, with or without the admixture of soap, but in the vineyard its ability to infect grapes may be partially prevented by indirect methods [cf. ibid., 31, p. 316], e.g., thorough control of the vine moths, *Clusia* [*Clysiana*] *ambiguella* and *Polychrosis botrana*.

Mazzei (I.). **Notas fitopatológicas. Control de la antracnosis de la Vid.** [Phytopathological notes. Control of Vine anthracnose.]—*AIA* (*Rev. Asoc. Ing. agron., Montevideo*), 22, 91, pp. 20–29, 1950. [Received June, 1952.]

This information on the control of *Gloeosporium ampelophagum* [*Elsinoe ampelina*] in Uruguay has already been noticed from another source [*R.A.M.*, 29, p. 494].

WILHELM (A. F.). **Zur Kenntnis von Kalimangelerscheinungen bei der Weinrebe Vitis vinifera L.** [Contributions to the knowledge of potassium deficiency symptoms in the Vine, *Vitis vinifera* L.]—*Phytopath. Z.*, 17, 3, pp. 240–265, 4 col. pl., 10 figs., 1950. [Received April, 1952.]

A vine disorder which has been under investigation in south Baden, Germany, since 1946 shows three grades of severity. The first is characterized by a deep blue to purple foliar discoloration, mostly confined to the upper leaf surface and starting at the margin. Occasionally the margins are normal while the rest of the lamina is dotted with discrete, later confluent spots, eventually spreading widely over the interveinal areas. During the ensuing necrosis, which starts in the epidermal cells and subsequently involves the mesophyll and lower epidermis, the bluish-purple colour turns to brownish-purple and finally to brown. These symptoms are mostly restricted to the fourth to sixth, occasionally up to the tenth leaf of the fruit-bearing shoots. The discoloration may appear as early as the end of May and usually increases rapidly after flowering, while necrosis, beginning in June, reaches a climax in July and August, when the leaves assume a spoon-shaped curve and frequently shrivel altogether. As a rule the veins are not involved, but sometimes they may be, especially in the Sylvaner variety, the discoloration and necrosis starting at once to spread evenly over them. In this phase of the disease the growth of the vines is not noticeably impaired, the clusters attaining full maturity, though the grapes are smaller than those of healthy stocks.

In the second phase the blue to purple discoloration is already more marked before flowering and the transition to necrosis follows with greater rapidity, the lower leaves being quite dry by the end of July. The symptoms are no longer confined to the leaves of fruit-bearing shoots but embrace all except the topmost. The growth of both foliage and stock is arrested, but a small crop may still be produced.

The severest phase is marked by a severe set-back in shoot development and fruit set. The inflorescences generally die and the few clusters that may be formed are small and do not ripen [cf. *R.A.M.*, 15, p. 773]. The colour of the stunted leaves tends to be pale rather than dark green, but the blue to purple tinge is less in evidence than in the earlier stages, necrosis usually commencing directly from the leaf margin. The area immediately surrounding the necrotic tissue is often very pale or bleached.

No close correlation could be established between the development of these symptoms and the variety or mode of cultivation of the vines, the composition of the soil, or climatic conditions. Although the disturbance is most prevalent and severe among young grafted vines, it also occurs in older and ungrafted stands, apparently flourishing on former meadowland sites.

It seemed likely from the literature that the pathological condition of the vines was a result of potassium deficiency and identical with the 'brunissure' described from France [ibid., 25, p. 202], and soil, leaf, and wood analyses did, in fact, reveal an intimate connexion between the symptoms and the potassium contents of the soil and plant. In a recent series of fertilizer experiments the disorder was effectively combated on light and medium soils by heavy amendments of potassium salts, which resulted in the disappearance of the symptoms after one to two years. However, on heavy soils with a high lime content a complete cure was not achieved within the same period, although the condition of the treated vines was improved. New plantings, especially on former meadowland and heavy calcareous soils, should therefore be given a supply of phosphoric acid as well as of potassium. The peculiar deep blue to purple discoloration of the upper leaf surfaces is a dependable diagnostic criterion of potassium deficiency.